

40 Rock

# POPULAR Computing WEEKLY

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20-26 September 1984

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Vol 3 No 38

## Acorn's new ABC micro



ACORN this week launches its range of business computers — called the ABC range.

The machines are based around a development of the BBC machine with 6502 core processor offered with a choice of second-processor options beginning with a Z80 — giving CPM compatibility — and including the 16/32 bit National Semiconductor 16032 — offering the Xenix operating

system — and at the top end the 80286 16/24 bit development from the 8086 giving the ABC range IBM compatibility.

All have full size keyboard, discs and monitor.

At the bottom end of the range is the Terminal — broadly a BBC machine with Econet, terminal-emulator software, 32K Ram and a 14 inch black-and-white monitor.

Next is the Personal Assis-

tant wordprocessor with one double-density 5.25 inch disc drive with up to 700K storage capacity. It is fully expandable to the top of the range machine.

The first of the ABC machines with the second process or options is the ABC 100 with two 700K drives and a Z80 second processor, which runs CPM. Like the Personal Assistant it has a 12 inch black-and-white monitor.

The second, the ABC 110, has a colour monitor, one 700K disc drive and a 10M Winchester hard disc.

The next two models, the ABC 200 and 210, use the 32016 16/32 bit chip and have 256K Ram. The 210 uses the Xenix operating system.

Finally, the ABC 300 and 310 machines use the Intel 80286 chip, a development from the 8086 and 8088 processor range, which gives the machines IBM compatibility running Digital Research Concurrent version 3.1 with 256K Ram, upgradable to 1M. Other specifications are similar to that of the 100 and 110 respectively.

The range is being previewed at the Personal Computer World Show, but will not be available until early 1985.

continued on page 5 ▶

## Oric's new Stratos

ORIC'S Cambridge-based research team is working on the successor to the Atmos which will be launched, in France, before the end of the year.

The new micro — with the working name of the Stratos — will be technically very similar to the Atmos and be based around the 6502 processor chip.

Commented Tansoft's marketing manager Adrian Rushmore "We will be providing software support for it. We do not have to adapt our existing titles for the new machine — it is software compatible with the Oric1 and Atmos machines."

Oric has been more successful in the rest of Europe than in the UK and is the market leader in France where the new machine is to be launched.

## Enterprise slips again

THE arrival of the long-awaited 64K Enterprise computer seems likely to have been delayed yet again.

Retailers have yet to be given firm delivery dates for Christmas and Prism, the machine's main distributor, has been told not to expect first machines until 1985.

continued on page 5 ▶

**INSIDE** ) PLUS/4 PACKAGES REVIEW ) SPECIAL TAPE OFFER )



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# Eureka!

THEN THE RACE IS ON!!!

## DEvised BY IAN LIVINGSTONE



The storylines for "Eureka!" are by Ian Livingstone, whose "Fighting Fantasy" books have sold over 2,000,000 copies. He's dreamed up some rather nasty tricks and twists for you in this Epic, because he has also devised the cryptic clues and conundrums in the booklet that goes with the program. He's the one who knows the answers.

"Eureka!" was programmed by Andromeda teams led by Hungarians Donát Kiss and András Császár. It took the equivalent of 5 YEARS to create, and the skills of 4 graphic artists, 2 musicians and a professor of logic too. We told them to stretch the hardware's capabilities, and make sure you were kept awake for hours!! They've done it...

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The race for the £25,000 starts on 31 Oct 1984 and closes on 31 Dec 1985.



There is a small squabble taking place in the *Popular* offices this week.

The subject of the mild wrangle is the ownership of a small yellow plastic bucket and green spade which arrived by post two weeks ago.

They are both a gift from the UK MSX working group and the first indication of the quantity of money, time and effort that the world's top electronics companies intend to spend to ensure that MSX will become a household word and will be hugely successful — regardless of the technical merit or otherwise of the system.

On Wednesday a selected group of microcomputer journalists — instead of attending the trade and press day of this year's Personal Computer World Show — will be clutching their buckets and spades on a day trip to the south of France — Juan-les-Pins to be precise.

For it is here in the Cote d'Azur — on the opening day of the Personal Computer World Show in London — that the MSX machines are to be officially launched. The hope no doubt is to detract attention from the UK micro companies which, together with Commodore, will be showing new machines at the show.

More than that, the trip serves to underline the scale of the promotional effort that will be going to ensure that there are no hiccups and that MSX achieves for the Japanese manufacturers their stated intention of becoming 'the first home computer standard'.

With all the Sunday supplement ads, the poster hoardings, national press and television promotion, it will be easy to forget what MSX is about.

It will be easy to forget that MSX is Z80, that MSX is 8-bit, that MSX is somewhat overpriced and that MSX isn't really anything new.

# POPULAR Computing WEEKLY

Vol 3 No 38

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Star Game > Tumbling dice in *Yahtzee* by Richard Dodd for the BBC

Street Life > Christina Erskine talks to Geoffrey Heath of video games company turned software house Activision

Hardware reviews > Commodore's new 'intelligent' Micrografix interface > The Lo-Profile keyboard alternative for the Spectrum

Software reviews > The Oric version of Quicksilver's *Velnor's Lair* > Test yourself on the Highway Code

Plus/4 review > This week, the software. John Cochrane looks at the integrated Rom software bundled with the Plus/4

Spectrum > L Herniman's program demonstrates the simple pulley system known as Attwood's Machine

Dragon > Create your own hi-res screen dump from machine code with Peter Whittaker's program

The QL Page > Alan Turnbull plunges into the depths of the QL's Rom

BBC Electron > Richard Browning's program simulates an oscilloscope

Commodore 64 > Trig functions on the micro by Mark Gornall

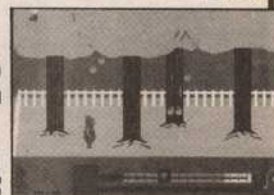
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ABC

56,052 copies sold every week  
(Jan-June 1984 ABC).

**How to submit articles** Articles which are submitted for publication should not be more than 2000 words long. The articles, and any accompanying programs, should be original. It is breaking the law of copyright to copy programs out of other magazines and submit them here — so please do not be tempted. **Accuracy** *Popular Computing Weekly* cannot accept any responsibility for any errors in programs we publish, although we will always try our best to make sure programs work.

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48K £6.95



## Enterprise

4 continued from page 1

The further delay to the machine — which has been dogged by problems since it was first due in the shops almost a year ago — appears to have been caused by design difficulties with the machine's so-called 'Nick' video chip.

"We hope to be out this autumn but we want to make sure that the product is fully debugged first," said Caroline Jones of Enterprise's marketing department. "At the moment we cannot say how many machines will be available this Christmas."

Caroline continued, "Prism will be distributing the Enterprise through its 700 outlets; we will also be selling through John Menzies, and Boots and W H Smith's have expressed an interest for 1985.

John Menzies' computer product manager Scott Coghill confirmed that John Menzies were in negotiations with Enterprise, but added, "As yet, we have been given no firm date for delivery."

And John Flatman, Boots computer buyer said, "It is possible we may take the Enterprise in 1985, but to do so, we would have to drop a machine already in stock, and I cannot think which one it would be."

Bob Denton, managing director of Prism said, "We have now been told that our first supplies of the Enterprise will not be until January — until recently we understood the first machines were due this month."

Enterprise's 128K model has been even further delayed and first machines are now not expected until first quarter next year.

## Spectravideo release

SPECTRAVIDEO is releasing a new MSX machine, the 728. It is fully MSX compatible and costs £249.95 retail. Spectravideo hopes to start shipping in October. It includes 80K Ram which breaks down to 64K Ram and 16K video Ram. It has 90 keys of which 10 are user programmable, and has a numeric key pad resolution of 256x192 pixels.

## Launch of Compunet

COMPUNET, Commodore's own Prestel-type interactive database system is officially launched this week.

Initially the service will be available only to Commodore 64 and SX64 owners. To access the system it will be necessary to buy the Commodore modem—which plugs into the 64's cartridge port and



connects to a standard British Telecom telephone socket allowing the micro to communicate the Compunet's main-frame computer.

The modem unit costs £99.99 and the price includes one year's free subscription to Compunet. Thereafter Compunet subscribers will have to pay an annual fee of around £30.

Connection to Compunet will be free between 6pm and 8am and subscribers will be able both up and down-load information and use its electronic mail and teleshopping

facilities—the latter available by joining Comp-U-Card, an on-line discount shopping scheme. Discounted commercial software will also be offered for down-loading. By the time the system is fully operational in mid-October, around 50 software packages will be available, including *Punchy* from Mr Micro and *Little Icarus*, *International Soccer*, *Humphrey* and *Pandora's Box* from Commodore.

The Compunet modem is a 1200/75 baud V23 full-duplex asynchronous device. Compunet operates at 1200/75 baud full-duplex with a 1200/1200 half-duplex up-load facility.

With 12 access points (nodes) distributed nationally, most subscribers should be able to access the system at local call rates.

Owners of the Commodore modem will not be restricted to Compunet, however. The device is also compatible with Prestel and Micronet—both of which can be accessed on payment of the relevant subscription, and the modem, within its 8K Rom, has a soft-load option direct communication from one Commodore 64 to another.

*Flex Editor/Assembler*, which we would be offering."

This offer should be available within the next week, and will apply only while stocks last.

Details from Compunet, Green Lanes, London N13.

## Your personal banker

KENT-based Hilton Computer Services is taking a gamble with its *Personal Banking System*.

Hilton to become the first UK home computer software company to distribute a program as Freeware.

Freeware is a form of distribution that gets round the problem of piracy in one fell swoop. The program is distributed by mail-order free of charge to those interested, who then send a voluntary contribution to the company.

In Hilton's case, the donation then entitles the user to after-sales support, and up-graded

## Norman's on the warpath

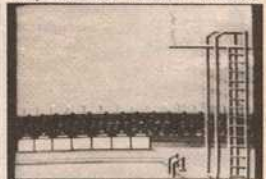
QUICKSILVA plans a strong line of products for the Autumn.

*Dungeon's of Ba and Castle of Jassoon*—both on disc for the C64 at £14.95 from the Canadian house Accelerated Software are what Quicksilva describes as "interactive films"—arcade adventures, featuring Norman the Warrior.

Another disc product for the 64 is *Summer Games* by Epyx; priced at £19.99 (also available on two cassettes for £14.95).

After a tie-up with the UK comic 2000AD Quicksilva has two titles featuring Strontium the Dog—*Strontium the Dog—the Killing* for the Spectrum (£6.97) and *Strontium the Dog and the Death Gauntlet* for the 64 (£7.95).

The follow-up to *3D Ant Attack* on the Spectrum is *Zombie*, *Zombie* which includes



MIDI sound Software, while *3D Ant Attack* is released for the 64.

Finally there is *Eric Bristow's Pro-Darts and Blood and Guts* for the Spectrum where you travel through the organs of the body "all in the best possible taste", both for the Spectrum.

versions of the *Personal Banking System*.

"I know we're taking a risk, and we could well be ripped off," said Jack Gibbons, Hilton's managing director. "Certainly if we were offering games, then I don't think people would pay, but this is a serious program, with a limited market, and I think it could work."

"We're making no guidelines as to how much people should donate—after all, if we told them its normal price, they may see that as an upper limit."

*Personal Banking System* is available for ZX81 (16K), 48K Spectrum (Microdrive compatible), BBC and Dragon (32 and 64K). Details from Hilton Computer Services, 14 Avalon Road, Orpington, Kent.



# Salamander SOFTWARE DISCOUNT CLUB

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# Letters

## Life giver

To get some life into Richard Gain's program *Life* (August 23 issue) do the following.

Poke 23326, 158

Poke 23327, 91

Poke 23450, 194

Poke 23451, 91

This will correct the code, which should then be re-saved.

A W Lee  
Bromley  
Kent

## Win some, lose some

Whilst I tend to agree with the broader aspects of the editorial (August 16), I find the statement, "Where is the software that doesn't assume we are all gibbering trigger happy idiots..." a little cynical.

It is clear that even gibbering idiots have a right to be catered for, although at the moment this does seem to be a little overdone.

However, there is software for the less idiotic of us. May I suggest that the editor has only to look to his own publication to find the intelligent and subtle software he refers to.

Scott Murdoch (Letters, August 30) mentioned the regular gripe with which we all agree — the price of software.

Having just purchased an Amstrad CPC464, I was none to excited at the price of software, or its availability.

Advertised in your recent editions was *The Trial of Arnold Blackwood*, an adventure game for the Amstrad. The price of £5.50 is just about what I consider fair for a decent game, so I ordered it. It has kept my brain working and

offered plenty of light relief with its weird humor. I haven't completed it yet, but the game inspires me to believe that I will.

I am sure that there are many more examples that meet with the cost, intelligence, subtlety factor, although it is often a case of win some, lose some.

I agree with Scott on the subject of documentaries, biographies, or even history books. If software is to be original, then it must surely avoid the known and well read. Perhaps it is creativity that is not in abundance.

Steve Drew  
34 Regents Square  
Belvedere  
Kent

## Interesting conversation

I thought I should write and tell readers of *Popular Computing Weekly* and owners of the Sinclair QL Computer of an interesting conversation I had with Mr Tim Fountain, a Sinclair Research official at Cambridge.

The subject of upgrades to the QL package came up, as Mr Fountain reiterated that the QL User Guide would be updated and sent free to all QL owners. He also informed me that the Psion applications software would be updated and distributed in a similar fashion.

When I asked what exactly the point was of my joining QLU — the QL Users' Bureau — he retorted, "It wouldn't be fair to offer the upgraded software to just QLU members."

Alan Turnbull  
Stockport  
Cheshire

## Complex words

I am sorry some readers had trouble with the Word Processor (Letters August 30). It is a very complex piece of software, but I think it is well worth the programming effort involved. I hope that the following will explain the difficulty with the input of new text.

There is no different process, whether you wish to input a new document, insert text into an existing piece, or edit the existing text. The method is

the same.

First you select how much of the existing text to display, then you add, change and delete text on the screen. Now you send the screen back to replace the text displayed. When you are typing in new text, you display none of the lines of existing text, and send back the new text.

If you have used the default settings as published, you can simply depress the *Return* key twice when you have to enter the line to start the edit at, and the number of lines to show on the screen. This will select the line after the last line you have entered so far — initially, of course, this is set to the very first line of the text.

To start a new piece, it is best to *Finish* the program, then *Run* again. This ensures that the line numbers and text are re-initialised.

To summarise — to input new text, edit a blank screen into the text you require.

I use the program, as printed for all my correspondence and I find it very reliable and entirely satisfactory. However, I should like to draw your attention to two misprints. The reference to the *FE* key in the instructions should read *F3*, and the odd words, "position to turn red", after Line 1825 belong to the end of Line 1830.

Simon Wallace  
Basilston  
Essex

## A form of flattery?

Mr Godwin says programmers want to keep their routines secret.

Is this always so? If I thought of something good, I would want everyone to know so they could say what a clever chap I was.

On another tack, does tape copying really reduce sales? When Psion announced *Scrabble*, I haunted WH Smith with £15 clutched in my hot little hand, waiting for the first consignment to come in. Ditto *Chequered Flag* and *The Quill*.

Now, I do have copied programs that other people have given me (who can say they have not?) but they are all things that I wouldn't have bought anyway. In fact I can imagine how copying can promote sales.

Three improvised arcade fans might contribute £5 each for original of Atari's over-priced *Pacman*, then make two copies. This would give Atari one sale when they otherwise would have had none. I suppose Mr Godwin would say this was one sale instead of three.

I don't know if this ever happens, but it is more likely than the proposition that every home copy represents one lost sale.

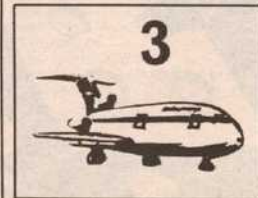
John Ward  
58 Burnham Road  
Leigh-on-Sea  
Essex

## Learn to Fly Competition: Week 3

Competition week 3 and here are this week's vouchers.

Collect the four weeks' vouchers and fill out the coupons printed in the last week. Send the form and the four 'plane' vouchers and you could win a go on a real flight simulator.

Send in the form and the second set of four vouchers and you are entitled to unbeatable discounts on Hewson Consultants flight simulation and ATC software.





# Yahtzee

Try your luck in this version of the old dice game for the BBC B by Richard Dodd

**Y**ahtzee is a five dice game written on the BBC micro computer model B. The object of the game is to score as many points as possible. There are many ways to do this, and these are shown on the score card. The simplest way of scoring points is to throw one or more of the same number. For example, if you throw three fours you will score 12 points.

There are also more complicated ways of scoring points. For example:

**1 Full House.** Three dice of one number and two or another, for example, three fives and two ones. This scores 25 points.

**2 Low Straight.** A sequence of four dice,

for example, two, three, four and five. This scores 30 points.

**3 High Straight.** The same as a low straight but a sequence of five dice. This scores 40 points.

**4 Yahtzee.** Five dice all of the same number. Scores 50 — the highest number of points.

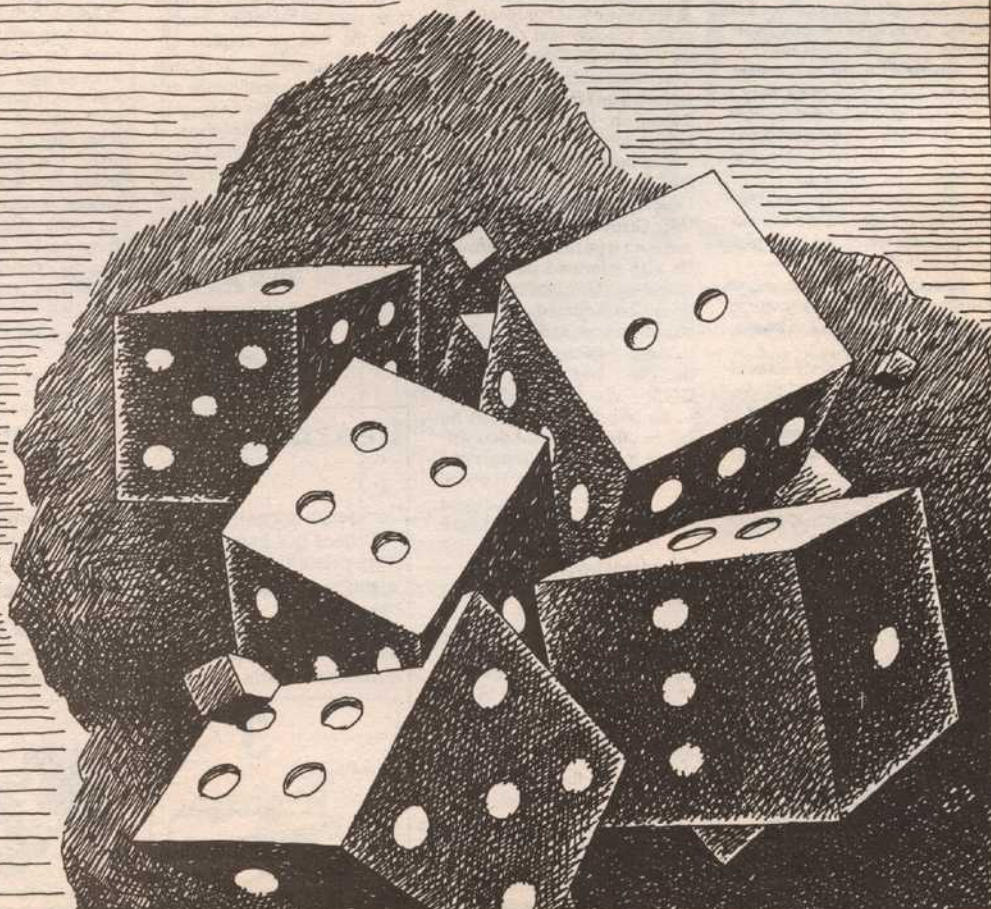
**5 Chance.** The points for chance are worked out by adding the total of all the dice together.

You can only enter one value into each section of the score card, so when you have thrown the dice you will have to decide into which is the best section to enter the score.

You have three goes to try and get a scoring combination and any number of the dice can be thrown each time. As you continue you may find that you cannot get a scoring combination and you will be asked which of the sections you wish to cross out.

At the end of the game the total for the top half is added up. If the total is over 63 a bonus of 35 is added. If more than one person is playing, each score card will be displayed separately and then the players' names in order of their scores.

The program is well structured, with self-explanatory procedure labels.





```

10 REM *****
20 REM *      YAHTZEE      *
30 REM *      Cn      *
40 REM *      Bv      *
50 REM *      *
60 REM *      Richard Dodd *
70 REM *****
80 ON ERROR RUN
90 DIM Die(5),Th(5)
100 PROCdef
110 MODE 7:PROCstart
120 Th=0:MODE 4
130 VDU 23:8202,0:0:0
140 FOR P% = 1 TO Nu
150 CLS
160 PROCchoice
170 PROCdecision
180 PRINT TAB(0,29);STRING$(39," ");PRINT TAB(5,29);
    "Any Key To Continue" :$=GET$
190 NEXT P%
200 Th=Th+1:IF Th>12 PROCend ELSE CLS:GOTO 140
210 MODE 7:PROCresults
220 RUN
230
240 DEF PROCstart
250 PRINT TAB(16,1);CHR$(141);"YAHTZEE"
260 PRINT TAB(15,2);CHR$(141);"YAHTZEE"
270 REPEAT:INPUT TAB(10,10);"Number Of Players ";Nu:
    UNTIL Nu>0 AND Nu<11
280 PRINT TAB(10,10);STRING$(29," ")
290 DIM Name(Nu),Score(Nu,14)
300 FOR N% = 1 TO Nu:PRINT TAB(0,10);STRING$(39," ");TAB
    (0,10);"Enter Name Of Player ";N%:" ";INPUT Name$(N%);
    Name$(N%)=LEFT$(Name$(N%),20):NEXT
310 ENDPROC
320
330
340 DEF PROCchoice
350 FOR C% = 1 TO 3
360 IF C% = 1 FOR C% = 1 TO 5:Die(C%)=INT(RND(6)):NEXT
    PROCprint:GOTO 530
370 L% = 20-(LEN(Name$(P%))/2):PRINT TAB(L%,1);Name$(P%)
380 PRINT TAB(13,3);"Throw Number ";C%-1
390 PRINT TAB(1,20);"Arrow Keys And RETURN to select die"
400 PRINT TAB(8,22);"ESC to roll dice again"
410 PRINT TAB(7,24);"END to see the Score Card"
420 $FX4,1
430 D=1:REPEAT:D1=(D-1)*8+3:PRINT TAB(D,13);"AAA" $X=GET
440 PRINT TAB(D,13);" "
450 IF $X=136 AND D1 D=D+1
460 IF $X=137 AND D1 D=D+1
470 D1=(D-1)*8+3
480 IF $X=13 AND Th(D)=0 PRINT TAB(D,12);"X":Th(D)=1
    ELSE IF $X=13 AND Th(D)=0 PRINT TAB(D,12);" "
490 IF $X=64 CLS:PROCchoice:PRINT TAB(5,29);"Any Key To
    Continue" :$=GET$:CLS:PROCprint:GOTO 370
500 UNTIL $X=82 OR $X=114
510 FOR C% = 1 TO 5:IF Th(C%)=1 Die(C%)=INT(RND(6)):
    Th(C%)=0:NEXT ELSE NEXT
520 CLS:PROCprint
530 NEXT
540 PRINT TAB(13,3);"Throw Number ";C%-1
550 PRINT TAB(1,20);"Any Key To Continue To Score Card"
    $=GET$
560 ENDPROC
570
580 DEF PROCprint
590 FOR X% = 1 TO 5
600 X1=(X-1)*8+3
610 IF Die(X)=1 PRINT TAB(X,10);CHR$(131);CHR$(130);TAB
    (X,11);CHR$(133);CHR$(132)
620 IF Die(X)=2 PRINT TAB(X,10);CHR$(135);CHR$(134);
    TAB(X,11);CHR$(136);CHR$(137)
630 IF Die(X)=3 PRINT TAB(X,10);CHR$(131);CHR$(138);
    TAB(X,11);CHR$(139);CHR$(132)
640 IF Die(X)=4 PRINT TAB(X,10);CHR$(140);CHR$(134);
    TAB(X,11);CHR$(136);CHR$(141)
650 IF Die(X)=5 PRINT TAB(X,10);CHR$(142);CHR$(138);
    TAB(X,11);CHR$(139);CHR$(143)
660 IF Die(X)=6 PRINT TAB(X,10);CHR$(144);CHR$(145);
    TAB(X,11);CHR$(146);CHR$(147)
670 IF Th(X)=1 PRINT TAB(X,12);"X"
680 NEXT X
690 ENDPROC
700
710 DEF PROCcheck
720 Total=0
730 IF Ch>0 AND Ch<=6 PROCNumbers
740 IF Ch=7 PROC_3
750 IF Ch=8 PROC_4
760 IF Ch=9 PROC_full
770 IF Ch=10 PROC_Low
780 IF Ch=11 PROC_High
790 IF Ch=12 PROC_yahtzee
800 IF Ch=13 PROC_chance
810 ENDPROC
820
830 DEF PROCNumbers
840 FOR C% = 1 TO 5:IF Die(C%)=Ch Total=Total+1
850 NEXT IF Total>0 Score(P%,Ch)=Ch*Total
860 ENDPROC
870
880 DEF PROC_3
890 Total=0:No=0:REPEAT:No=No+1
900 FOR C% = 1 TO 5:IF Die(C%)=No Total=Total+1
910 NEXT
920 IF Total<3 Total=0
930 UNTIL Total=3 OR No=6
940 IF No=6 AND Total<3 GOTO 960
950 FOR C% = 1 TO 5:Score(P%,Ch)=Score(P%,Ch)+Die(C%):NEXT
960 ENDPROC
970
980 DEF PROC_4
990 Total=0:No=0:REPEAT:No=No+1
1000 FOR C% = 1 TO 5:IF Die(C%)=No Total=Total+1
1010 NEXT
1020 IF Total<4 Total=0
1030 UNTIL Total=4 OR No=6
1040 IF No=6 AND Total<4 GOTO 1060
1050 FOR C% = 1 TO 5:Score(P%,Ch)=Score(P%,Ch)+Die(C%):NEXT
1060 ENDPROC
1070
1080 DEF PROC_full
1090 Total=0:No=0:REPEAT:No=No+1
1100 FOR C% = 1 TO 5:IF Die(C%)=No Total=Total+1
1110 NEXT
1120 IF Total<3 Total=0
1130 UNTIL Total=3 OR No=6
1140 IF No=6 AND Total<3 GOTO 1220
1150 Total=0:No=0:REPEAT:No=No+1
1160 FOR C% = 1 TO 5:IF Die(C%)=No1 AND No1<No5
    Total=Total+1
1170 NEXT
1180 IF Total<2 Total=0
1190 UNTIL Total=2 OR No1=5
1200 IF No1=5 AND Total<2 GOTO 1220
1210 Score(P%,Ch)=25
1220 ENDPROC
1230
1240 DEF PROC_Low
1250 FOR X% = 1 TO 5
1260 FOR Y% = X TO 5
1270 IF Die(X)=Die(Y) E=Die(X)+Die(X)+Die(Y)+Die(Y)=E
1280 NEXT:Y=X
1290 Total=0:D% = 1:C% = Die(1)+1:REPEAT:D% = D%+1:IF C%>Die
    (C%) Total=Total+1:C% = D%
    ELSE C% = C%+1
1300 UNTIL Total=2 OR D%=5
1310 IF Total<2 Score(P%,Ch)=30
1320 ENDPROC
1330
1340 DEF PROC_High
1350 FOR X% = 1 TO 5
1360 FOR Y% = X TO 5
1370 IF Die(X)=Die(Y) E=Die(X)+Die(X)+Die(Y)+Die(Y)=E
1380 NEXT:Y=X
1390 Total=0:D% = 1:C% = Die(1)+1:REPEAT:D% = D%+1:IF
    C%>Die(C%) Total=Total+1:C% = Die(C%)+1 ELSE C% = C%+1
1400 UNTIL Total=1 OR D%=5
1410 IF Total<1 Score(P%,Ch)=40
1420 ENDPROC
1430
1440 DEF PROC_yahtzee
1450 Yaht=TRUE
1460 C% = 1:S% = Die(1):REPEAT:C% = C%+1:IF Die(C%)<S%
    Yaht=FALSE
1470 UNTIL C%=5
1480 IF Yaht=TRUE Score(P%,Ch)=Score(P%,Ch)+50
1490 ENDPROC
1500
1510 DEF PROC_chance

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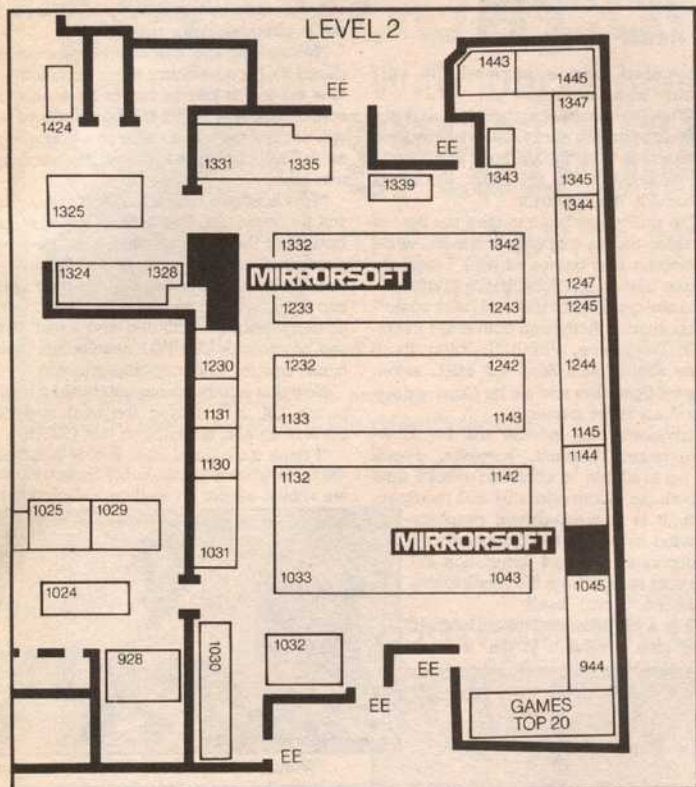


```

1520 IF Score(P,Ch)>8 GOTO 1540
1530 FOR C=1 TO 5:Score(P,Ch)=Score(P,Ch)+DIE(C)*NEXT
1540 ENDPROC
1550
1560 DEF PROCdecision
1570 CROSS=TRUE:CH=0:REPEAT:Ch=C+1
1580 IF C=12 AND Score(P,Ch)=0 PROCyshtzee:IF
Score(P,Ch)=50 CROSS=FALSE
1590 IF C=12 AND Score(P,Ch)=50 PROCyshtzee:IF
Score(P,Ch)=100 CROSS=FALSE
1600 IF Score(P,Ch)>8 GOTO 1620
1610 IF Score(P,Ch)=0 PROCcheck:IF Score(P,Ch)>8
CROSS=FALSE
1620 UNTIL C=13 OR CROSS=FALSE
1630 IF CROSS=FALSE GOTO 1650
1640 PROCcross:GOTO 1740
1650
1660 CLS:Score(P,Ch)=0:PROCadd
1670 PRINT TAB(0,29):"Enter Your Choice (0 to see dice)"
1680 GET:Ch=ASC(A$)
1690 IF Ch=64 CLS:PRINT TAB(15,3):"You Threw"PROCprint
1700 GET:CLS:PROCadd:GOTO 1670
1710 IF Ch=64 AND Ch<90 Ch=Ch-64 ELSE Ch=Ch-96
1720 IF Ch<1 OR Ch>13 GOTO 1670
1730 IF Score(P,Ch)>8 AND Ch<12 PRINT TAB(3,29):
STRING$(10," ")GOTO 1670
1740 PROCcheck:IF Score(P,Ch)=2 PRINT TAB(3,29):
STRING$(10," ")GOTO 1670
1750 PROCscore
1760 ENDPROC
1770
1780 DEF PROCcross
1790 CLS:PROCadd
1800 PRINT TAB(0,29):"Which One You Going To Cross Out "
1810 GET:Ch=ASC(A$)
1820 IF Ch=63 AND Ch<90 Ch=Ch-64 ELSE Ch=Ch-96
1830 IF Ch<1 OR Ch>13 GOTO 1790
1840 IF Score(P,Ch)>8 GOTO 1780 ELSE Score(P,Ch)=1
1850 PROCscore
1860 ENDPROC
1870
1880 DEF PROCadd
1890 Top=0:Bottom=0:Grand=0
1900 FOR A=1 TO 6:IF A%<1 Top=Top+Score(P,A)
1910 NEXT
1920 PRINT TAB(30,12):Top:IF Top=63 Top=Top+35:PRINT
TAB(30,13):35
1930 PRINT TAB(30,14):Top
1940 FOR A=7 TO 13:IF A%<1 Bottom=Bottom+Score(P,A)
1950 NEXT
1960 PRINT TAB(30,26):Bottom:IF Bottom=128:Bottom=Bottom+152:PRINT
TAB(30,27):152
1970 PRINT TAB(30,28):Grand
1980 ENDPROC
1990
2000 DEF PROCend
2010 FOR P=1 TO Nu
2020 CLS:PROCadd:PROCadd
2030 Score(P,14)=Grand
2040 PRINT TAB(5,29):"Any Key To Continue":A$=GET$
2050 NEXT
2060 ENDPROC
2070
2080 DEF PROCresults
2090 FOR X=1 TO Nu
2100 FOR Y=X TO Nu
2110 IF Score(X,14)<Score(Y,14) E=Score(X,14):Score(X,
14)=Score(Y,14):Score(Y,14)=E:X=Name$(X):Y=Name$(Y)
2120 NEXT
2130 PRINT TAB(17,1):CHR$(141):"RESULTS"
2140 PRINT TAB(17,2):CHR$(141):"RESULTS"
2150 PRINT:PRINT
2160 PRINT TAB(5):"Position":TAB(20):"Player":
TAB(30):"Score"
2170 PRINT
2180 FOR P=1 TO Nu:PRINT TAB(9):P:TAB(19):Name$(P):
TAB(31):Score(P,14):NEXT
2190 PRINT TAB(6,18):"Any Key To Run Program again":A$=GET$
2200 ENDPROC
2210
2220 DEF PROCcard
2230 PRINT "Score Card"
2240 PRINT:PRINT
2250 PRINT "Choice Bonus Your Score"
2260 PRINT STRING$(39,CHR$(148))
2270 PRINT CHR$(149):"A":CHR$(149):"Aces
1+1+1 = 3 "CHR$(149):"B":CHR$(149):"Bones
2+2+2 = 6 "CHR$(149):"C":CHR$(149):"Threes
3+3+3 = 9 "CHR$(149):"D":CHR$(149):"Fours
4+4+4 = 12 "CHR$(149):"E":CHR$(149):"Fives
5+5+5 = 15 "CHR$(149):"F":CHR$(149):"Sixes
6+6+6 = 18 "CHR$(149):"G":CHR$(149):"Sevens
7+7+7 = 21 "CHR$(149):"H":CHR$(149):"Eights
8+8+8 = 24 "CHR$(149):"I":CHR$(149):"Nines
9+9+9 = 27 "CHR$(149):"J":CHR$(149):"Tens
10+10+10 = 30 "CHR$(149):"K":CHR$(149):"Jacks
11+11+11 = 33 "CHR$(149):"L":CHR$(149):"Queens
12+12+12 = 36 "CHR$(149):"M":CHR$(149):"Kings
13+13+13 = 39 "CHR$(149):"N":CHR$(149):"Aces
14+14+14 = 42 "CHR$(149):"O":CHR$(149):"Bones
15+15+15 = 45 "CHR$(149):"P":CHR$(149):"Threes
16+16+16 = 48 "CHR$(149):"Q":CHR$(149):"Fours
17+17+17 = 51 "CHR$(149):"R":CHR$(149):"Fives
18+18+18 = 54 "CHR$(149):"S":CHR$(149):"Sixes
19+19+19 = 57 "CHR$(149):"T":CHR$(149):"Sevens
20+20+20 = 60 "CHR$(149):"U":CHR$(149):"Eights
21+21+21 = 63 "CHR$(149):"V":CHR$(149):"Nines
22+22+22 = 66 "CHR$(149):"W":CHR$(149):"Tens
23+23+23 = 69 "CHR$(149):"X":CHR$(149):"Jacks
24+24+24 = 72 "CHR$(149):"Y":CHR$(149):"Queens
25+25+25 = 75 "CHR$(149):"Z":CHR$(149):"Kings
26+26+26 = 78 "CHR$(149):"A":CHR$(149):"Aces
27+27+27 = 81 "CHR$(149):"B":CHR$(149):"Bones
28+28+28 = 84 "CHR$(149):"C":CHR$(149):"Threes
29+29+29 = 87 "CHR$(149):"D":CHR$(149):"Fours
30+30+30 = 90 "CHR$(149):"E":CHR$(149):"Fives
31+31+31 = 93 "CHR$(149):"F":CHR$(149):"Sixes
32+32+32 = 96 "CHR$(149):"G":CHR$(149):"Sevens
33+33+33 = 99 "CHR$(149):"H":CHR$(149):"Eights
34+34+34 = 102 "CHR$(149):"I":CHR$(149):"Nines
35+35+35 = 105 "CHR$(149):"J":CHR$(149):"Tens
36+36+36 = 108 "CHR$(149):"K":CHR$(149):"Jacks
37+37+37 = 111 "CHR$(149):"L":CHR$(149):"Queens
38+38+38 = 114 "CHR$(149):"M":CHR$(149):"Kings
39+39+39 = 117 "CHR$(149):"N":CHR$(149):"Aces
40+40+40 = 120 "CHR$(149):"O":CHR$(149):"Bones
41+41+41 = 123 "CHR$(149):"P":CHR$(149):"Threes
42+42+42 = 126 "CHR$(149):"Q":CHR$(149):"Fours
43+43+43 = 129 "CHR$(149):"R":CHR$(149):"Fives
44+44+44 = 132 "CHR$(149):"S":CHR$(149):"Sixes
45+45+45 = 135 "CHR$(149):"T":CHR$(149):"Sevens
46+46+46 = 138 "CHR$(149):"U":CHR$(149):"Eights
47+47+47 = 141 "CHR$(149):"V":CHR$(149):"Nines
48+48+48 = 144 "CHR$(149):"W":CHR$(149):"Tens
49+49+49 = 147 "CHR$(149):"X":CHR$(149):"Jacks
50+50+50 = 150 "CHR$(149):"Y":CHR$(149):"Queens
51+51+51 = 153 "CHR$(149):"Z":CHR$(149):"Kings
52+52+52 = 156 "CHR$(149):"A":CHR$(149):"Aces
53+53+53 = 159 "CHR$(149):"B":CHR$(149):"Bones
54+54+54 = 162 "CHR$(149):"C":CHR$(149):"Threes
55+55+55 = 165 "CHR$(149):"D":CHR$(149):"Fours
56+56+56 = 168 "CHR$(149):"E":CHR$(149):"Fives
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58+58+58 = 174 "CHR$(149):"G":CHR$(149):"Sevens
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68+68+68 = 204 "CHR$(149):"Q":CHR$(149):"Fours
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72+72+72 = 216 "CHR$(149):"U":CHR$(149):"Eights
73+73+73 = 219 "CHR$(149):"V":CHR$(149):"Nines
74+74+74 = 222 "CHR$(149):"W":CHR$(149):"Tens
75+75+75 = 225 "CHR$(149):"X":CHR$(149):"Jacks
76+76+76 = 228 "CHR$(149):"Y":CHR$(149):"Queens
77+77+77 = 231 "CHR$(149):"Z":CHR$(149):"Kings
78+78+78 = 234 "CHR$(149):"A":CHR$(149):"Aces
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165+165+165 = 495 "CHR$(149):"J":CHR$(149):"Tens
166+166+166 = 498 "CHR$(149):"K":CHR$(149):"Jacks
167+167+167 = 501 "CHR$(149):"L":CHR$(149):"Queens
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185+185+185 = 555 "CHR$(149):"D":CHR$(149):"Fours
186+186+186 = 558 "CHR$(149):"E":CHR$(149):"Fives
187+187+187 = 561 "CHR$(149):"F":CHR$(149):"Sixes
188+188+188 = 564 "CHR$(149):"G":CHR$(149):"Sevens
189+189+189 = 567 "CHR$(149):"H":CHR$(149):"Eights
190+190+190 = 570 "CHR$(149):"I":CHR$(149):"Nines
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192+192+192 = 576 "CHR$(149):"K":CHR$(149):"Jacks
193+193+193 = 579 "CHR$(149):"L":CHR$(149):"Queens
194+194+194 = 582 "CHR$(149):"M":CHR$(149):"Kings
195+195+195 = 585 "CHR$(149):"N":CHR$(149):"Aces
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198+198+198 = 594 "CHR$(149):"Q":CHR$(149):"Fours
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316+316+316 = 948 "CHR$(149):"E":CHR
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## Avoiding the pitfalls

Christian Erskine talks to Geoffrey Heath at Activision

In an industry not noted for slick professionalism and sophisticated marketing—instead one tends to think of individuals working all night running off cassettes on the kitchen table—Activision has earned some renown in both areas.

Formed in 1979 by Jim Leavey, who had a long background in video games, it made its name with games such as, Freeway, Grand Prix, Pitfall and River Raid for the Atari 2600. In June 1983, the company went public in the US.

Its UK division was established at the beginning of this year as Activision prepared to move from producing cartridge software for Atari to establish material for a wider base of machines.

The American influence has been much in evidence in its advertising, with promotional videos, and expensive—well, it looks expensive—packaging.

I therefore expected UK managing director Geoffrey Heath to at least have a transatlantic accent, fat cigar and possibly a Stetson on the hatstand. None of these things materialised.

Geoffrey was plucked from 20 years in the British music publishing business

had ended, and it seemed the only answer," said Geoffrey.

"The time between the idea and the actual launch this autumn has been taken up with setting up the UK base and writing the conversions for the other machines, particularly the Spectrum.

"The policy has been to take the best of our video games and enhance them, while developing new games as well. I suppose if video games come back into vogue, we could always convert them all back again."

This autumn Activision converted Beamrider, Decathlon, Pitfall II, River Raid, Space Shuttle and Zenji for MSX, seven titles for Spectrum and six for Commodore, from Atari video games.

Activision's next release will be something rather different, however. *Pencil* will be available in about six weeks time for both the Commodore 64 and the Spectrum. It is a menu-driven graphics-drawing aid — on the Commodore it incorporates a sound generation aid. The user selects from the menu to program the 'pencil' itself.

"It is a bit different," said Geoffrey. "The idea behind it is that a lot of

four and 18 years old. Parents don't get involved until later. In a way, computers are developing along similar lines to the pocket calculator market.

"Not so long ago, calculators were considered to be something a bit gimmicky—now my son is told he has to have one for school. In a few years, the home computer will occupy the same status in a household as the telephone, the TV or the washing machine.

"This is where I think the MSX machines will be important. The technology may be basic, but they'll be reliable, and the next generation will I'm sure be much improved. Machines like MSX will find their way into households in which people aren't particularly computer-minded and I can also see companies like JVC developing their music centres to incorporate a micro."

Now that Activision has established itself in the UK, it is taking the next step to conformity and applying to join GOSH.

"I think it's a good idea if only because we're in what is still a small industry and we should all get on well with each other."



"Within GOSH, I'd like to see them getting much more aggressive over piracy—after all, the music industry has managed to curb piracy to a large extent and I think the software industry can do it too".

In case anyone reading this is now rubbing their hands with glee at the thought of an Activision-Microdeal confrontation (after Activision halted sales of the Microdeal title *Cuthbert in the Jungle*) within the Guild of Software Houses, they will be disappointed. "The Microdeal episode is over and done with. We did the right thing, they did the right thing, and it's all water under the bridge now.

"But it does seem to have engendered a view that we are a giant 'nasty American' company, which is rubbish. Four years ago, it was a one-room set-up designing cartridge games for the Atari 2600.

Comparison are frequently drawn between software and the pop music industry—how does Geoffrey, having worked in both, view them. "They're certainly similar in that both are 'hits' businesses—you're dealing with a product that's in vogue.

"In terms of progress, though, the software industry is tremendously exciting—you have to keep on one foot all the time, and it'll continue at a fast pace, as long as people have more and more leisure time, and spend a lot of that time in the home."

with ATV Music and Heathlevy Music among others to set up and develop Activision's base in Britain and Europe. Today there are eight people housed in the UK offices with a further two in France. Next on Activision's target list is Germany, and then comes Japan.

The plans to diversify from the Atari VCS machines evolved over a year ago in the US. "They were making plans then to begin converting the games to Commodore—and Spectrum for the British market—and also the MSX machines. The Atari boom

people play games, without really understanding what the computer is doing. This helps build up a picture, as it were, of what programming involves. If you had to describe Activision's products in one sentence, they're 'software for leisure purposes', and I think our *Pencil*, fits that description." *Pencil*, incidentally, will cost around £10.00 for the Commodore version and in that region of £8.00 on Spectrum.

The 'leisure software' is largely aimed at a young market—"My view is that the majority of home computer users are between





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## Head down

**Hardware LoProfile keyboard Micro Spectrum Price £49.95 Supplier Advanced Memory Systems, Green Lane, Appleton, Warrington.**

There are now at least half-a-dozen manufacturers producing alternatives to the Spectrum's tacky rubber keyboard. The LoProfile, by Advanced Memory Systems, seems to be one of the best available, because it's good-looking, electromechanically simple, and easy to fit.

The latest version improves in many small ways the original ProFile design. Like the first model, it's low and wide — needlessly wide, since much of the space inside ends up empty — and looks more like a QL than anything else. To the right of the main keyboard is a 12-key extra pad, which duplicates the numerical, full stop, caps shift and cursor keys. There's thankfully a proper space bar which is a boon in word-processing applications.

The new design has tasteful silk-screened red flashes across the front right and along the top, though nowhere will you find the words Sinclair Spectrum. The key legends are accurately and durably reproduced, with the colour information printed on the case above the top row of keys.

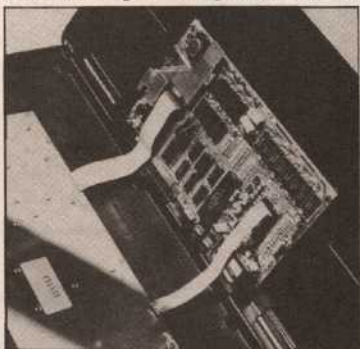
The case itself is in two pieces. The top half is high-impact plastic. Unfortunately, for some reason the same isn't true of the base — it's a much more flimsy plastic, which appears rather brittle for this application.

The keys themselves are pitched oddly, as you'll see if you examine them from the side, but this doesn't seem to affect their performance. There's a satisfying "click" and since there's no "buffer" between the



LoProfile and the Spectrum's printed-circuit board, you can't type faster than the machine allows — or at least I can't.

Fitting is simplicity itself, and this is a great advantage of the LoProfile over other keyboards which may require you to hammer, file, saw, solder and twist your Spectrum into shape. The Spectrum's entire



circuit board is removed from its case — thus voiding your guarantee, remember — and is fitted over four screws on the base of the LoProfile. Two ribbon cables, connected to the sealed LoProfile keyboard, are then clipped into sockets on the pcb. This is made easier because AMS has added small tabs of pcb to the end of the cables.

Having screwed on the top of the LoProfile case, you're ready to go. The Spectrum ports end up at the back of the new keyboard, so it's easy to connect the power lead, Save/Load cables, and peripherals. One slight problem is that the hole left for the user port is very large — just to ensure that no foreign objects get into the keyboard, it might be an idea to invest in a Currah Microslot motherboard, which neatly fills the gap. It's good practice to use a Microslot anyway, since it's cheaper to replace a worn-out Microslot than it is to replace a worn-out Spectrum.

All in all it's a joy to use a real keyboard on the Spectrum, and the simplicity and appearance of the LoProfile make it a good choice.

**Chris Jenkins**

## Imp print

**Hardware Micrographic Interface MW350 Micro Commodore 64 Price £90 Supplier Impex Designs, Metro House, Second Way, Wembley, Middlesex.**



One of the latest add-ons for the Commodore range of home computers (including the new C16 and Plus/4 models) to cross the Atlantic is a very ambitious intelligent Centronics printer interface. The Micrografix interface MW-350 is ambitious because not only does it provide a Centronics output to any standard printer, but it also uses the Commodore Serial I/O port as if it were a Commodore printer, produces a full set of Commodore graphics characters on most common dot-matrix printers, produces legible replacements for the graphics characters if required, and allows for an in-built buffer of up to 4096 bytes.

The interface uses a CMOS 6502 microprocessor to decode any output from the Commodore computer and to drive the printer as required. Different printers are catered for by alternative machine-code routines held in Rom. Printers on which graphics can be produced include the Epson range, Mannesman Tally, Microline, Seikosha, Star, Riteman, and NEC. Many

other dot-matrix printers use the same command codes as one of these and hence can be used satisfactorily, assuming the printer has a graphic mode.

Using the interface is exactly the same as using a Commodore printer, but with some additional facilities. Commercial software, such as for word processing, should thus still work happily. Additional facilities include setting of page length, margins, conversion of all output to print ASCII codes only, re-setting the Commodore device number and secondary address recognised by the interface, and changing the auto-linefeed setting.

The importer, Impex Designs (UK) provide a full customer service. They keep a list of printers which are compatible with the full graphics facilities and will try to sort out any problems which may arise. The price above includes a 2K buffer.

**John Cochrane**



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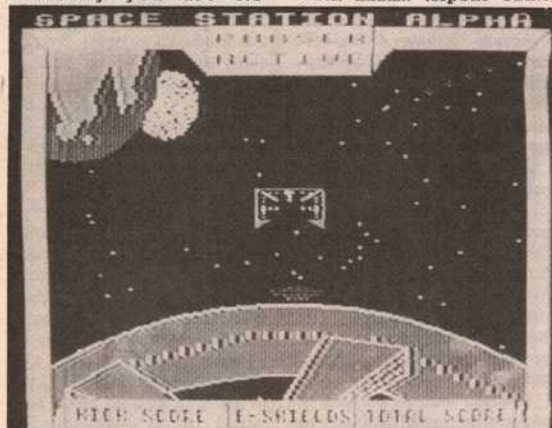
## Obliterated

**Program** Space Station Alpha  
**Micro BBC B Price** £7.95 **Supplier** Icon Software, 65 High Street, Gosforth, Tyne and Wear.

As the Cylon fleet commences its final assault on planet Earth, one last space station — Space Station Alpha — remains to resist their attempts... and quite naturally you are its

partial view of the space station, the Earth and the Moon (or is it the Sun?) in the background, and the dynamic elements — the missile sights, and the Cylon ships swooping in from the top right of the screen to deliver their lithium torpedoes before weaving away across the display.

The duration of the game is determined by the strength of the Earth's defence shields, the force of which is depleted from its original value of 10000 with each lithium torpedo strike.



commander.

Described on the cover as a 'Graphical Space Battle', the visual display on *Space Station Alpha* is a colourful yet simple mixture of fixed graphics — a

10000 is a generous point to start from and provides for a good length game. Without laying a hand on the controls, I sat and watched the first three waves of the Cylon fleet batter

away for about five minutes before the Earth's defences finally cracked. When its shields are exhausted, the Earth is doomed and is obliterated from the screen in an explosion which sends debris flying off into space.

Two criticisms of the game. Firstly, the action is limited to a single, repetitive attack sequence. There are no screen changes and only slight variations in the speed and altitude of the Cylon ships as successive waves are destroyed. Inevitably, therefore, whilst the addictive challenge of 'up-ing' the high score remains, I found that I reached my 'game-saturation' level that much sooner.

Secondly, I was unable to discover any instructions on my copy of the game, either on the presentation box cover, as advised on the cassette label, or as an 'intro' in the program. Fortunately, the controls were all fairly standard, the game loading with the CH." (previously reset PAGE=&E00 if a DFS is fitted), and with Z-(left), X-(right), \*- (up), ?(down) and Space-(fire) as the 'in-game' controls.

On the whole, pretty average arcade action.

Simon Wilson



## Alien blobs

**Program** SOS Micro Spectrum  
**Price** £5.95 **Supplier** Visions, 1 Feldgate Mews, Studland St, London W6.

Another one for the arcade freaks here, with the usual menu of various alien blobs, a rather underpowered space shuttle and a pathetic bunch of humans to rescue from a hostile planet.

You arrive in a mother ship, which says the instructions, is in geostationary orbit. I wish people would think before they write, as the mother ship moves about until you leave it, whereupon it conveniently stays still. The shuttle motors are unable to move you up the

screen before you pick up a survivor, but the extra weight seems to invigorate them, as on take off you are unable to move down the screen. Oh well, it's only a game.

There are joystick options for Kempston and Sinclair, and the controls worked well. I can't say the graphics were very special, nor was the sound anything to write home about, but the game is very playable, and will prove addictive for some.

Simon Finch has come up with a competent game, 100% machine code and using many good techniques (though it won't work with Interface I attached). It's up with the field, although probably not special enough to be one of the leaders.

Simon Springett



## Profitable

**Program** French Revision Level 1 Micro Spectrum **Price** £4.99 **Supplier** Southern Educational Software, 4 Priory Rd, Maidstone, Kent ME15 6NW.

Hands up all parents who thought that buying a computer would help

your child with his or her school work. Hands down if it has. All those with aching arms and children aiming to take CSE or "O" level modern languages can now redeem the situation by getting hold of a series of no gimmicks, but user-friendly learning tapes from Southern Educational Software.

I sampled the *French Revision Level 1* tape and found it to be well worth the asking price of £4.99. The programs — two different lessons — teach verbs, nouns and adjectives, and follow up with a series of tests of knowledge learned. Both were at a very basic level, and covered the ground thoroughly if a little tediously at times.

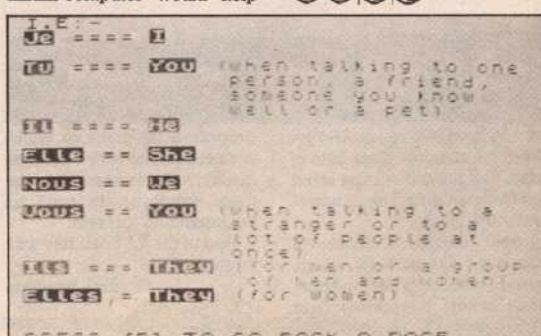
The tests were, I felt, rather too easy: they were all of the "multiple guess" variety, and thus could leave you feeling that you knew more than you actually did — but this was only Level 1.

The programs are written in Basic and are well protected against the amateur hacker. I suspect the level of protection is responsible for a number of loading problems I had: one part of the program would not work with Interface 1 attached, probably due to some machine code in Rem statements in the loader program.

The only graphics used are for accented letters, and sound is not used especially well, but the display is clear and does make use of colour and large printing.

All in all a more profitable use for your Spectrum than *Space Invaders*, and with the new term just beginning these packages should sell well.

Simon Springett





## Take-off!

**Program Air Traffic Control**  
Micro Spectrum Price £8.99  
Supplier Mikro-Gen, 44 The  
Broadway, Bracknell, Berks.

The first thing that I must say is that I had never even seen, let alone played, an air traffic control simulation before. But then they say that comparisons are odious.

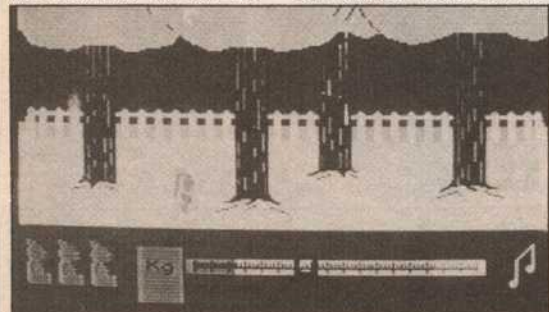
As an Area ATC, one has to direct the inbound, outbound, and local flights over an area of central/southern England. The purpose of the game is not to land planes, but to administer their flight paths over the area of your control. Needless to



## On the slopes

**Program Bear George Micro**  
Spectrum Price £5.95 Supplier  
Cheetahsoft, 24 Ray St., London  
EC1.

My first viewing of this game was by way of an introduction to the RAT, the remote joystick. The sense of excitement and interest generated by said device was such that Tic Tac Toe



would have been a hit. And yet here we sit in the clear light of day, and the game must stand on its own merits. These, however, are few.

Bear George consists of three 'playing screens' which, upon successful completion, then repeat themselves over and over again. First you must

say, there are various problems, such as errant RAF aircraft over which you have no control, unstable cabin pressure on some planes, collision courses and so on.

By far the most attractive part of this package is the remarkable attention to detail that is shown in both the program and the manual. Mikro-Gen have not fallen short of offering a challenge; at level seven out of nine, the program simulates a busy summer's day at Heathrow, with up to 60 flights an hour to be dealt with.

There were many things that surprised me about playing ATC, not least being the fact that I actually enjoyed the experience. I am not sure if I would play it frequently, but it certainly provides a welcome diversion from main-stream micro entertainment.

Gordon Sneddon



catch and eat falling apples while dodging most aggressive acorns. Then to the ski slopes, to take George to his cave and avoid the malicious skier.

Now only some fairly uninspiring, though deadly, spiders block George's way to six months sleep. If he has eaten enough apples, he will survive hibernation without starving. Thrilling, huh?

Believe me, it isn't. The most commendable feature of this

program is the graphics, which are certainly of above average quality, and it is a shame to see them employed in such an undemanding context.

And of the RAT? I'll stay with joysticks.

Gordon Sneddon



3 This sign on the central reservation means

- a End of crawler lane
- b Lane closed ahead
- c No crash barrier
- d Use the hard shoulder



## L plates

**Program Highway Code Micro**  
Spectrum Price £8.95 Supplier  
Datek Computing, 11  
Warwick Court, Princes Drive,  
Harrow, Middx.

You can't actually learn to drive on a Spectrum as yet, but Highway Code will help you to pass the test when you get around to taking it. This is a straightforward educational program teaching some of the main aspects of the Code in a useful way, and enabling you to test yourself against an impartial judge.

It could lead to an end of nagging the rest of the family to test you in the days leading up to the cycling proficiency or driving test. It uses to the full the micro's ability to be a patient and infallible teacher.

## No humour

**Program Velnor's Lair Micro**  
Oric/Atmos Price £8.95 Supplier  
Quicksilver, P.O. Box 6,  
Wimborne, Dorset BU21 7DY.

The goal of this text only adventure is to seek out Velnor the Black Wizard hiding in the Goblin Labyrinth of Mount Elk. A skilful adventurer should be able to spot the false trails, pick up clues and objects and avoid being wiped out too quickly by the collection of enemies lurking in the maze. The labyrinth is complex and something is encountered at almost every move, there being enough tricks and puzzles to keep even a well-seasoned adventurer occupied.

The text itself is fairly descriptive but perhaps lacking originality in the settings

The program is very user friendly, and covers a variety of topics. It seems to be written in machine-coded Basic; thus the sections load as bytes, but run fairly slowly. The 'fill' routine in the section on signs giving positive orders was one yawning example. There is good break protection, making the program ideal for the inexperienced user.

The tests are timed so that you have an incentive to answer quickly, and you are given your score at the end of the test. Importantly, there is an option to 'Correct Mistakes', as well as to see the solutions.

Written mainly for the car driver, the program will still be of use to other road users, and would be an ideal gift for anyone starting to ride or drive.

Simon Springett



(caves and passages) and monsters (the ubiquitous Ogre). The text also lacks any sense of humour to offset the seriousness of being killed.

As an adventure game Velnor's Lair is very good, but don't let Velnor the Illusionist fool you into thinking this game has any resemblance to Dungeons & Dragons as the cassette blurb states.

Velnor's Lair can be played as one of three characters, Warrior, Wizard or Priest. Warriors have strength points only, whilst Wizards and Priests have strength and spell points. Spells are obviously useful, although they can backfire. However, I found little difference when playing these characters and the use of 'hit' points superfluous.

Vic Fielder





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# Working in Plus/4s

John Cochrane take a first look at the four Rom software packages included with Commodore's new Plus/4 micro

Commodore are producing two new machines for the home computer market this year. The C16 looking very much like a Vic20/C64 but with improved Basic, and the Plus/4 with a full 64K of user memory (less around 5K for the system variables and the display memory).

The C16 and the Plus/4 share the same Commodore Basic 3.5, but there the resemblance ends. The Plus/4—in my opinion much the more stylish of the two machines—also contains a suite of built-in software known as 3-PLUS-1.

This gives facilities for word processing, record filing, spreadsheet operations, and simple graphics.

However, do not begin to think that Commodore are throwing the gauntlet down in Sinclair's direction. 3-PLUS-1 is simply not in the same class as the QL software despite offering full integration.

Integration is a well-used word these days for machines such as the IBM PC, and integrated software comes in many colours. Commodore have undoubtedly scored several points with 3-PLUS-1 which is integrated into the machine. Press a button or two and the ROM-based software is up and running, no loading from disc or cursing of microdrives here, and since all the packages are available in memory at the same time, and it is very easy to transfer data from one to the other. The disadvantage—in the case of the Plus/4 is that the four packages are contained in two Roms totalling 32K of memory. Even though they call routines from the system Rom and kernel, the size of the programs has still had to be kept quite small and, consequently, quite simple.

**Data Manager** is the data filing program which works to the common theme of setting up a number of very similar records, names and addresses for instance, on disc then allowing various operations to be performed. Searches can be made for particular data items, perhaps a particular name, the records can be sorted alphabetically,

and the records can be used to supply names or other information for use with the word processor. This last feature is perhaps the one offering most practical potential as it allows things like personalised circulars, mailshots, and data-file reports to be easily and rapidly produced.

The word process or is of limited capability, offering only 99 lines of 77 characters. Sufficient for letter writing but not much else. Also, as the screen display is limited to only 37 characters, a rather clumsy system of panning across the document being typed has been adopted, making it difficult to read and edit a document. Still, the basics are there. (The illustration here has used carriage returns



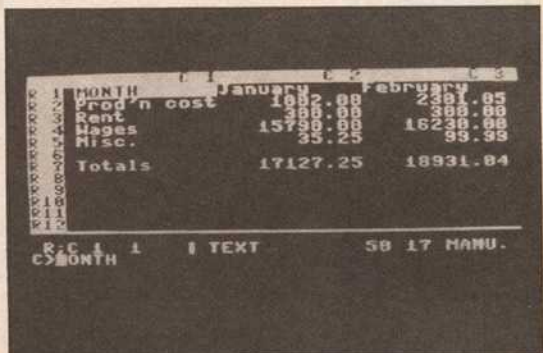
half-way through each line in order to be able to show the whole document on-screen at the same time.)

Spreadsheets can also be set up, on a grid of cells in 50 rows and 17 columns. Memory limitations will usually mean that only about half these cells can actually be used however. Commodore has decided to go its own way on the spreadsheet in terms of the manner of addressing individual cells and with some of the functions provided

for setting up the spreadsheet. If you have used other spreadsheets then you will probably find this one slow and limited. If you are a beginner then I would advise you to avoid this one as you will soon outgrow it and may experience unnecessary confusion transferring to another. The value of the

program is that it is almost instantly available and can be used to set up data for transferring to the word processor.

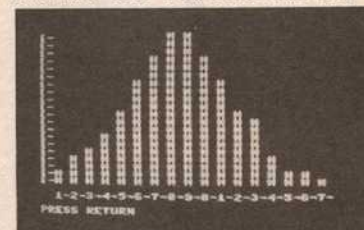
Finally, the graphics package. Very limited is the most apt description. This is the PLUS-1 program in the 3-plus-1 package



and is really just a tag-on to the spreadsheet which allows a visual representation of data to be rapidly set up and transferred to the word processor. Commodore claims to have avoided using the high-resolution screen in order to provide a graph which can be reproduced by a standard Commodore printer, and I must admit that the printer commands are built into the software. Even so, I would have thought it would be possible to provide a little more in the way of alternative display formats, this thing will not even show negative values and only one set of data can be viewed at any one time.

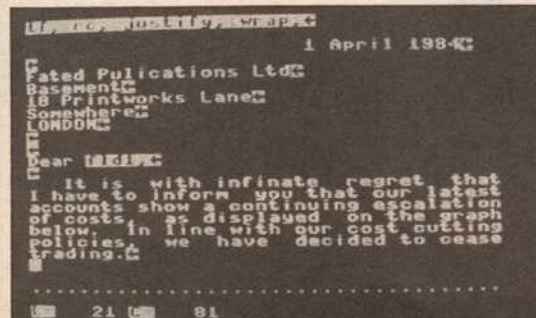
All the programs do really require a disc drive to store data—using a cassette drive is rather clumsy—and so the real cost of the full system, less printer, is getting high.

On the whole I think that Commodore could have done a bit better than this.



The limited scope of the software will unfortunately mean that the Plus/4 is unlikely to find favour—as Commodore has indicated it should—with small businesses. At the Plus/4's official launch last week Howard Stanworth, general manager of Commodore UK, did admit: "A typical buyer will not be running a business using the Plus/4—if so it will be a very small business."

The Plus/4 is a good—if a little overpriced at £299—machine made better by its integrated software. But don't buy the machine just for its software.





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# Pulling a few strings

L Herniman demonstrates the pulley system known as Atwood's machine in micro form

This program demonstrates a simple pulley system known as 'Atwood's Machine' in which two masses are connected by a light inelastic string passing over a smooth frictionless pulley.

The acceleration of the two masses and tension in the string are calculated after values for the two masses have been entered. A diagram shows the directions of the forces, and each step of the calculation is clearly displayed. The two answers given for each are the acceleration only, and

acceleration due to gravity. Gravity is taken as 9.8 m/sec/sec, but may be changed in line 10.

The program uses the equation from Newton's Second Law, Force = mass  $\times$  acceleration ( $F = ma$ ). When applying this to our pulley system, the smaller mass will always move upwards, as the tension in the string is greater than its weight, ie, tension - weight = upward force. The larger mass moves down, obviously, with a force of weight - tension ( $= m \times a$ ). Note that if the

masses are the same, the system remains stationary in equilibrium.

To make the program self contained, the notation used is printed at the start, but this can be left out by deleting line 5 and lines 400 to 460.

## Program notes

- 30-60 Inputs masses and sorts them so that  $m_1$  is the smaller.
- 70-100 Prints out statements.
- 110-130 Works through equation to find acceleration.
- 180-170 Substitutes value of acceleration in the first equation and finds tension.
- 220-230 Generates four graphics.
- 260-330 Prints out screen.
- 400-460 Prints out notation.

© L Herniman 30/1/84

## "PULLEY"

-Atwood's Machine-  
(A Level Mechanics)

```

5 CLS : GO SUB 400:
REM For instructions only
10 GO SUB 220: LET t$=CHR$ 145
+CHR$ 32: LET g=9.8: GO TO 30
20 GO SUB 260
30 INPUT "Enter value of each
mass>";m1,m
40 IF m1<m THEN LET m2=m: GO TO
50 IF m1>m THEN LET m2=m1: LET
m1=m: GO TO 70
60 PRINT AT 21,1;"System remai
ns in equilibrium": PAUSE 200: G
O TO 20
70 PRINT AT 16,20;m1;"gN";AT 2
0,29-(m2>g);m2;"gN";
80 PRINT AT 2,0;"From Newton's
2nd Law, F=ma"
90 PRINT "For ";m1;"kg mass, T
>wght";t$;"T-mg=ma";t$;"T=ma+mg
100 PRINT "For ";m2;"kg mass, T
<wght";t$;"Mg-T=Ma";t$;"T=Mg-Ma
110 PRINT t$;m1;"a+";m1;"g=";m
2;"g-";m2;"a": LET tm=m1+m2: LET
tm2=m2-m1
120 PRINT t$;"tm";a="";tm2;
"q": LET s=(tm2/tm)*g: LET s$=5
TR$ s: LET s$=s$(TO 3)
130 PRINT t$;"a=";tm2;"g/";
tm;"m/s";CHR$ 147" or a=";s$;
"m/s";CHR$ 147
140 PRINT "Sub in 1st equation
150 PRINT TAB 2;"T=";m1;"a+";m
1;"g"
160 PRINT t$;"T=";m1*tm2;"g/";t
m;"a+";m1;"g";TAB 13;"or T=";m1;
"a+";m1*gr
170 PRINT t$;"T=";m1+m1*tm;"g/";
tm;"m";TAB 13;"or T=";m1*(VAL s
$)+m1*gr;"N"
180 INPUT "Press ENTER-restart,
c-copy";LINE n$
190 IF n$<>"c" THEN GO TO 20
200 COPY : GO TO 180
210 REM Graphics and screen
220 FOR a=USR "a" TO USR "d"+7
230 READ n: POKE a,n: NEXT a
240 DATA 24,60,126,219,153,24,2
4,24,24,24,153,219,126,60,24
250 DATA 0,0,32,0,4,0,32,0,192,
64,128,192,0,0,0

```

```

260 BORDER 5: PAPER 5: INK 0: C
LS
270 PRINT AT 0,7; INVERSE 1;"AT
TWOOD'S MACHINE"
280 PLOT 219,144: CIRCLE 219,14
4,25
290 PLOT 195,144: DRAW 0,-80: D
RAW 1,0: DRAW 0,72
300 PLOT 244,144: DRAW 0,-112:
DRAW -1,0: DRAW 0,102
310 PRINT AT 8,24;CHR$ 144;"T";
AT 8,29;"T";CHR$ 144
320 PRINT INK 1;AT 14,24;CHR$ 1
43;AT 18,30;CHR$ 143
330 PRINT AT 15,24; INK 2;CHR$
145;AT 19,30;CHR$ 145
340 INK 2: PLOT 179,84: DRAW 0,
40: DRAW 1,0: DRAW 0,-40
350 PRINT AT 6,22;CHR$ 144: INK
0: PRINT AT 7,23;"a"
360 PRINT AT 1,0;"To Find: T,a"
370 PLOT 170,164: DRAW 0,-138
380 RETURN
390 REM Optional instructions
400 RESTORE 440: PRINT TAB 11;
"NOTATION": LET d$=".....
410 FOR r=1 TO 5: READ r$
420 PRINT TAB 3;r$(1);d$(TO
25-LEN r$);r$
430 NEXT r
440 DATA "Tension","acceleratio
n","gravitational accel.,""Newto
n","mass"
450 PRINT TAB 9;"Press any K
ey"
460 PAUSE 0: RESTORE : RETURN
500 SAVE "PULLEY" LINE 1: VERIF
Y ""

```

## ATTWOOD'S MACHINE

```

To Find: T,a
From Newton's 2nd
Law, F=ma

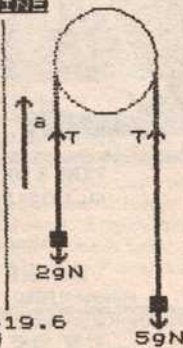
For 2kg mass, T>wght
: T-mg=ma : T=ma+mg

For 5kg mass, T<wght
: Mg-T=Ma : T=Mg-Ma

2a+2g=5g-5a
7a=3g
a=3g/7m/s^2
or a=4.2m/s^2

Sub in 1st equation
T=2a+2g
T=6g/7+2g or T=2a+19.6
T=16g/7N or T=28N

```







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# DEVS EX MACHINA

WRITTEN AND DIRECTED BY MEL CROUCHER  
48K ZX SPECTRUM PROGRAM BY ANDREW STAGG



# This way to the dump ...

Peter Whittaker explains how to set up a machine code hi-res screen dump

The Dragon's hi-resolution screen is made up of 256\*192 pixels, which are organised into 192 rows of 32 bytes each. If a pixel is set on the screen, the relevant bit is set to a 1, and if the pixel is reset the bit is cleared. This format is not immediately compatible with the Seikosha Printer, which prints a column of seven dots at a time. (Fig 1.)

A basic screen dump can be written using the *PPoint(x,y)* command, but it is very slow. Machine code is much faster. Assembler #1 (memory dump #2) is a small screen dump program using little over half the printer's capability. Assembler #2 (memory dump #1) is a double sized screen dump using the printer's full width.

Instead of the *PPoint* command, we use the machine code equivalent of the *And* function. By *Anding* a register and test byte, we set only the bits in the register which are also set in the test byte, and clear all the rest. The test byte is unaffected. If we load the A register with #73 and we *And* it with #31, the test byte will still contain #31, but the A register will now contain #9. (Fig 2.)

To test *PPoint(0,0)* we load the relevant byte into A (*LdA* 1536) and *And* it with #128 (*AndA* #128). If the pixel was set, A will

contain #128, otherwise A will contain a 0.

By *Anding* a column of seven bytes, we can build up a byte (*@Num*) to send to the printer. The first time through we want to set the first bit of *@Num*, and the second bit on the second pass etc. This is quite long-winded to program. It is easier to set the eighth bit each time, and to scroll all the bits one place right.

This is done using the *LsrA* command. (Fig 3.) Having moved all the bits one place right, it places a 0 in the eighth bit. Doing this seven times will move the first bit from the eighth position to the first, the second to the second etc. All we need to do is add #128 (*AddA* #128) to tell the printer that this is graphics data, and send it to the printer (*Jsr* \$800F).

To loop through the column of bytes eight times, once for each bit, we need to decrease the number we are *Anding* with the bytes (*@bit*), using the *LsrA* command again. When *@bit* falls to 0, we know that we have completed that column and can move onto the next.

The next thing to check is whether or not we have reached the end of the line. Here the Dragon memory layout is very convenient. There are 32 bytes across the screen,

and by *Anding* any byte address with #31 (*LdD* #1540: *AndB* #31) we discover how far across the screen we are. (Fig 4.) When the B register returns a 0, we know that we have reached the end of this line and started the next. A carriage return is sent to the printer, and the pointer is incremented by 192 to move it to the start of the next block of seven lines. A check is made to make sure the end of the screen had not yet been reached, and the program continues. The last thing the program does is print a *Chr*(15) to return to text mode.

To use the printer to the full, we need to double up the size of the screen dump. However, nothing is for free, and because the printer only prints 480 dots to a line (while 256\*2pixels=512) we lose the right hand edge of the screen. The process is the same as for the small screen dump, except that we are printing each dot twice. When we scroll the bits in *@Num* the *AsrA* command is used and then the *LsrA*. This is so that the eighth bit is not cleared with the first scroll (Fig 3.) Similarly, instead of sending a column of seven pixels to the printer, we are sending three and a half, each twice. The first line of print we send pixels 1,1,2,2,3,3,4 and the second 4,5,5,6,6,7,7 and so on.

Before *Execing* these programs enter *PClear5:PMode0,3:PCls*. Remember to protect the programs with *Clear200,32000* and to call them *Exec32001*.

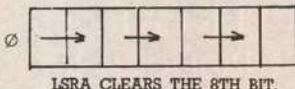
## PIXELS

0,0	1,0	2,0	3,0			S	1537 (address)	1538
0,1						E		1570
0,3						I		1602
						K		
						O		
						S		
						H		
0,7						A		

Byte stored by Dragon

Arrangements of pixels and bytes in dragon hi-res graphics screen memory (Fig 1.)

**BEFORE**  
 @ BIT 00011111 (31)  
 A register 01001001 (73)  
 00001001



LDD # 1540

ANDB # 31

A. reg 0 0 0 0 0 1 0 0  
 B. reg 0 0 0 0 0 1 0 0  
 AND 0 0 0 0 0 1 1 1

B register = 0 0 0 0 0 0 1 0 0

= 4th column of 8-31.

Fig 4. ANDing the D. register with #31 to find position on screen.

Fig 2. The effect of 'AND'ing two bytes

Fig 3. The LSR & ASRA commands.



## ASSEMBLER 1. SMALL SCREEN DUMP.

7001	80	PRT	7049	44	50	LSRR	
7001	8680	20	ESTART LDA #128	704A	877D88	50	STA @BIT
7003	B77D88	20	STA @BIT	704D	8100	50	CMPP #0
7005	8E05E0	20	LDX #1504	704F	2702	50	BEQ @BIT4
7009	BF7D89	20	STX @POINTER	7051	2003	50	BRA @BIT3
700C	860D	20	LDA #13	7053	8680	60	@BIT4 LDA #123
700E	BD800F	20	JSR #800F	7055	B77D88	60	STA @BIT
7011	8688	20	LDA #8	7058	8E7D89	60	LDX @POINTER
7013	8D800F	20	JSR #800F	705B	3001	60	LEAX 1,X
7016	BE7D89	30	@BIT3 LDX @POINTER	705D	BF7D89	60	STX @POINTER
7019	7F7D89	30	CLR @NUM	705F	FC7D89	60	LDX @POINTER
701C	C607	30	LDB #7	7063	C41F	60	RAND #31
701E	308820	40	@BIT2 LEAX 32,X	7065	C100	60	CMPP #0
7021	A684	40	LDA ,X	7067	26A0	60	BNE @BIT3
7023	B47D89	40	ANDR @BIT	7069	8E7D89	60	LDX @POINTER
7025	8100	40	CMPP #0	706C	308900C0	60	LEAX 192,X
7026	2702	40	BEQ @BIT1	7070	BF7D89	60	STX @POINTER
702A	867D88	40	LDA @NUM	7073	860D	60	LDA #13
702D	8680	40	ADDA #128	7075	5D800F	60	JSR #800F
702F	B77D88	40	STA @NUM	7078	3C1E00	60	CMPP #7680
7032	B67D88	50	@BIT1 LDA @NUM	707B	2599	60	RLO @BIT3
7035	44	50	LSRR	707D	860F	60	LDA #15
7036	BF7D88	50	STA @NUM	707F	8D800F	60	JSR #800F
7039	5A	50	DECB	7082	860D	60	LDA #13
703A	C100	50	CMPP #0	7084	8D800F	60	JSR #800F
703C	26E2	50	BNE @BIT2	7087	39	60	RTS
703E	B67D88	50	LDA @NUM	7089	30	70	@BIT FCB 123
7041	8680	50	ADDA #128	708B	0000	70	@POINTER FCB 0
7043	BD800F	50	JSR #800F	708B	00	70	@NUM FCB 0
7045	B67D88	50	LDA @BIT	708C		80	END @START

## MEMORY DUMP #1. BIG SCREEN DUMP.

32000	255	134	128	183	125	155	142	5	224	191	125	156
32012	134	13	189	129	15	134	8	169	128	15	190	125
32024	156	127	125	158	198	3	48	136	32	166	132	180
32036	125	155	129	0	39	8	182	125	158	139	126	183
32048	125	158	182	125	158	71	68	183	125	158	90	193
32060	0	38	229	48	136	32	166	132	180	125	155	129
32072	0	39	8	182	125	158	139	128	183	125	158	182
32084	125	158	68	129	128	183	128	15	189	128	15	182
32096	125	155	68	183	125	155	129	0	39	2	32	170
32108	134	128	183	125	155	129	125	156	48	1	191	125
32120	156	232	125	155	198	0	193	0	38	148	190	125
32132	156	48	136	66	191	125	156	140	30	0	37	15
32144	134	15	189	128	15	134	13	189	128	15	57	128
32156	0	0	0	190	125	156	127	125	158	49	196	32
32168	166	132	188	125	155	129	0	39	5	134	64	183
32180	125	158	198	0	48	136	32	166	132	180	125	155
32192	129	0	39	8	182	125	158	139	128	183	125	158
32204	182	125	156	71	68	183	125	158	90	193	0	38
32216	223	182	185	158	139	128	189	128	15	159	128	15
32228	182	125	155	68	183	125	153	129	0	38	176	134
32240	128	183	125	155	190	125	156	48	1	191	125	156
32252	252	125	156	196	30	193	0	38	154	190	125	156
32264	48	136	98	191	125	156	140	30	2	16	37	255
32276	1	22	255	128	245	255	255	255	233	255	255	255

## MEMORY DUMP #2. SMALL SCREEN DUMP.

32000	255	134	128	183	125	136	142	5	224	191	125	137
32012	134	13	189	128	15	134	8	182	125	15	190	125
32024	137	127	125	139	198	7	48	136	32	166	132	180
32036	125	136	129	0	39	8	182	125	158	139	126	183
32048	125	139	182	125	139	68	183	125	158	90	193	0
32060	38	224	182	125	139	128	183	128	15	182	125	
32072	136	68	183	125	136	129	0	39	2	32	195	134
32084	128	183	125	136	190	125	137	48	1	191	125	137
32096	252	125	137	196	31	193	0	38	173	190	125	137
32108	48	137	0	192	191	125	137	134	13	189	128	15
32120	140	30	0	37	153	134	15	189	128	15	134	18
32132	189	128	15	57	128	0	0	0	255	0	37	15

EXEC 32001



# Mr. Pettigrew has been keeping a few secrets from us.



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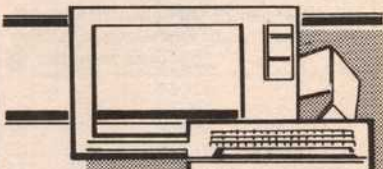
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## The Rom approach

Alan Turnbull reveals the dark secrets of the QL ROM

One of the first things the new QL owner must surely do is examine the read-only memory (Rom) of his or her machine and find out how the whole thing works.

With the Sinclair QL, this may prove difficult as there are at least four versions of the machine in existence: code-named 'FB', 'PM', 'AH' and the latest, 'JM'.

Version 'FB' was in a sorry state with Rom bugs too numerous to mention. Version 'PM' was a vast improvement but, Sinclair said, 'AH' was to be the final Rom.

As ever true to their word, Sinclair brought out a new Rom called 'JM', which "puts right all major Rom bugs, implements multi-tasking and makes SuperBasic much faster". Apparently, all customers will be offered an up-grade to this version by a strict 'recall operation' which involves you posting your precious QL off to Camberley, and Sinclair engineers plugging in the new Rom chips.

Meanwhile, if you are lucky enough to own the quite respectable version 'AH' (and you can find out by typing `PRINT VER$` at your console), this article may prove very useful if you want to reveal the dark secrets of the QL Rom.

The program in Figure 1 gives a tabulated 'dump' of two special tables in the QL Rom. The first table, residing at address 26652 in version 'AH', lists all command keywords and their run-time module address. The second table at address 27328 lists all function keywords and their run-time module address.

Each table is held identically in the following format:

```

>number of entries:
>first module address offset:
>number of characters in first keyword:
>first keyword:

>second module address offset:
>number of characters in second keyword:
>second keyword:

and so on.
```

The SuperBasic procedure *Tabulate* in Figure 1 automatically tabulates on the QL screen any table held in this format, giving its start address. Suitable alteration will allow output through the serial ports to a printer.

The output from the program is shown in Figure 2 and consulting this list and looking through the Rom routines at the addresses given may reveal many secrets.

For instance, any of the commands which take zero or optional parameters, such as *Run*, *List*, *Renum*, *Pause*, etc, may be called directly from SuperBasic using the *Call*

command! For example, to list all of the current program in memory type `Call 28036`.

In fact, if you wish to call your own machine-code routine in Ram from SuperBasic, you should make sure the MC68008 data register D0 holds zero before doing a RTS. Also, A6 should not be altered: it is used by SuperBasic and QDOS as a pointer, similar in function to the IY index register on the ZX Spectrum.

If D0 holds a number between 235 and 255 inclusive, the QL will use this as an error number. D0 = 235 gives "Bad line", 236 gives "Read only" and so on up to 255, which

gives "Not complete".

Calling routines like *List* is of no direct benefit — just illustration. But given these Rom routine addresses, the adventurous programmer could find out how to *Load* and *Save* Microdrive files or draw ellipses from machine code.

It must be noted, however, that whilst some of the command routines may be called directly, the function routines cannot. This is because the result of each function is placed in an area of Ram analogous to the ZX Spectrum's 'calculator stack', ready for picking up by the expression evaluator, and hence no return is made to the SuperBasic user.

It is hoped, nonetheless, that readers will find the routine and output presented in this article useful and that they, too, will delve into the secrets of the QL Rom.

```

100 REMARK Program to tabulate routine addresses in QL ROM.
110 REMARK (C) COPYRIGHT August 1984, Alan Turnbull.
120 :
130 MODE 512
140 CLS
150 CSIZE 80:1:1
160 PRINT @:"Use CTRL & F5 keys together as 'toggle' to pause output."
170 UNDER 1:CSIZE 2:1 PRINT "COMMAND ROUTINE ADDRESSES":CSIZE 0,0 UNDER 0
180 PRINT
190 TABULATE 26652
200 PRINT
210 UNDER 1:CSIZE 2:1 PRINT "FUNCTION ROUTINE ADDRESSES":CSIZE 0,0 UNDER 0
220 PRINT
230 TABULATE 27328
240 CLS @
250 PRINT @:"Program finished o.k."
260 CSIZE 80:0,0
270 STOP
280 :
290 REMARK Procedure to tabulate ROM table
300 :
310 DEFINE PROCEDURE TABULATE(table_address)
320 LOCAL padding$, number_of_entries, ROM_address, entry_number, offset, routine_address, number_of_characters, keyword, character
330 LET padding$=FILL$( " ", 12)
340 LET number_of_entries=PEEK_W(ROM_address)
350 LET ROM_address=table_address+2
360 FOR entry_number=1 TO number_of_entries
370 LET offset=PEEK_W(ROM_address)
380 LET routine_address=ROM_address+offset
390 LET ROM_address=ROM_address+2
400 LET number_of_characters=PEEK(ROM_address)
410 LET ROM_address=ROM_address+1
420 FOR keyword_characters=1 TO number_of_characters
430 PRINT CHR$(PEEK(ROM_address))
440 LET ROM_address=ROM_address+1
450 END FOR keyword_characters
460 PRINT padding$+1 TO 12-number_of_characters:
470 IF PEEK(ROM_address)=0 THEN LET ROM_address=ROM_address+1
480 PRINT routine_address,
490 END FOR entry_number
500 PRINT
510 END DEFINE TABULATE
```

Figure 1

### COMMAND ROUTINE ADDRESSES

PRINT	28586 RUN	38232 STOP	38334 INPUT	28594 WINDOW	30646
BORDER	38634 INK	28364 STRIP	28368 PAPER	28372 BLOCK	30650
PAN	28486 SCROLL	28410 CSIZE	24756 FLASH	26826 UNDER	26920
OVER	26848 CURSOR	24792 RT	24806 SCALE	26180 POINT	26118
LINE	26136 ELLIPSE	26160 CIRCLE	26168 ARC	26240 POINT_R	26122
TURN	38416 TURNTO	38408 PENUP	38474 PENDOWN	38478 MOVE	30492
LIST	28836 OPEN	25926 CLOSE	25892 FORMAT	25714 COPY	25740
COPY_N	25744 DELETE	25570 DIR	25576 EXEC	25246 EXEC_W	25250
LEYTES	25368 SEXEC	25414 8BYTES	25418 SAVE	25964 MERGE	30270
NRUN	38258 LORD	38312 LRUN	38318 NEW	38330 CLEAR	30220
OPEN_IN	25930 OPEN_NEW	25934 CLS	28482 DRILL	24548 RECOL	25836
RANDOMISE	23318 PAUSE	28490 POKE	28526 POKE_W	28534 POKE_L	28548
BRUU	24388 BEEP	24368 CONTINUE	38404 RETRY	38334 READ	25208
NET	28336 MODE	28308 RENUM	29628 DLINE	28886 SDATE	25806
RDITE	24996 LINE_R	26140 ELLIPSE_R	26164 CIRCLE_R	26164 ARC_R	26244
AUTO	23582 EDIT	25978 FILL	25990 WIDTH	38624	

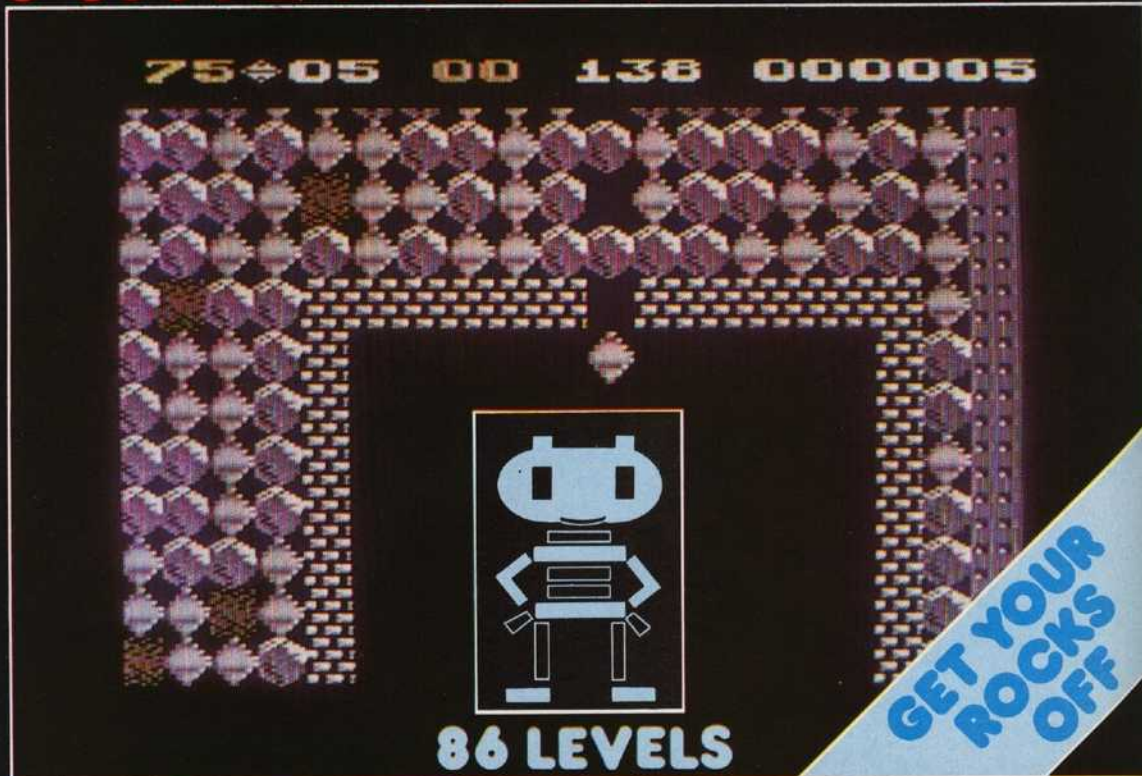
### FUNCTION ROUTINE ADDRESSES

ACOS	38860 ACOT	38866 ASIN	38872 ATAN	38878 COS	38884
COT	38890 EXP	38896 LN	38902 LOG10	38908 SIN	38914
SORT	38920 TAN	38926 DEG	38932 RAD	38938 AND	31010
INT	31110 ABS	30970 PI	31096 PEEK	31134 PEEK_W	31142
PEEK_L	31152 RESPR	31186 EOF	31228 INKEY\$	31274 CHR\$	31368
CODE	31476 KEYROW	31614 BEEPING	31208 LEN	31456 DIM\$	31516
DAY\$	31630 DATE	31596 DATE\$	31624 FILL\$	31378 VER\$	31258

Figure 2



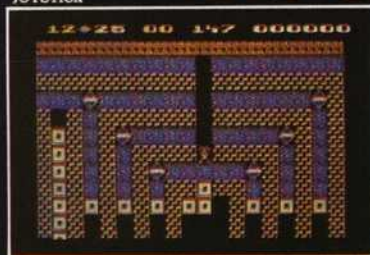
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

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## Plenty of 'scope

**Richard Browning** (well, his program) simulates the working of an oscilloscope

**T**his oscilloscope program is a very basic example of the effects when you place negative charges near positive-

ly charged electrons. As like charges repel and unlike charges attract, interesting effects can be made.

### Program notes

- 60 Defines oscilloscope drawing procedure
- 160 Defines T/B plates - positive or negative for each set variation
- 280-320 A% according to response to Proselect
- 480-600 Draws electron stream according to variation selected.

```

10MODE 1
15PRINTTAB(20,7)"T"
17PRINTTAB(20,12)"B"
20PROCosc
30PROCreselct
40PROCelectrons
50GOTO30
60DEF PROCosc
70MOVE 400,400
80FOR AZ=180 TO 360 STEP 5.625
90A=RAD(AZ)
100DRAW 400+300*SIN(A),700+300*COS(A)
110NEXT AZ
120DRAW 800,800:MOVE 400,400:DRAW 800,600
130DRAW 1050,600:DRAW 1050,800:DRAW 800,800
140GCOL0,1:MOVE 700,750:DRAW 600,750:GCOL0,2:MOVE 700,650:DRAW 600,650
150ENDPROC
160DEF PROCreselct
170PRINT TAB(0,20)"CRO T/B plates : "
180PRINT SPC(8)"TOP (+ or -) ?";G=GET:VDUG
190PRINT "SPC(8)"BOT (+ or -) ?";D=GET:VDUD
200IF NOT(G=ASC"+" OR G=ASC"- " OR D=ASC"+" OR D=ASC"- ") THEN GOTO 170
210IF G=ASC"- " AND D=ASC"- " THEN GOTO 260
220IF G=ASC"+" AND D=ASC"+" THEN GOTO 280
230IF G=ASC"+" AND D=ASC"- " THEN GOTO 300
240IF G=ASC"- " AND D=ASC"+" THEN GOTO 320
250ENDPROC
260VDU 19,1,3;0;AZ=1
270GOTO250
280VDU 19,2,1;0;AZ=-1
290GOTO250
300AZ=2
310GOTO250
320VDU 19,2,3;0;19,1,1;0;AZ=-2
330GOTO250
340DEF PROCelectrons
350IFAZ=-1 GOTO 380
360IFAZ=-2 GOTO 400
370IFAZ=2 GOTO 420
380PROCELS(725,"N")
390ENDPROC
400PROCELS(700,"Y")
410ENDPROC
420PROCELS(800,"Y")
430ENDPROC
440DEFPROCELS(HZ,L$)
450IF L$<>"N" THEN GOTO 480
460MOVE 900,700:DRAW 200,700
470ENDPROC
480IF HZ=700 THEN GOTO 550
490MOVE 750,700
500FOR A1=200 TO 230 STEP 5
510A=RAD(A1):DRAW 750+200*SIN(A),800+100*COS(A)
520NEXT A1
530DRAW 225,900
540ENDPROC
550MOVE 685,698
560FOR A1=355 TO 300 STEP -5
570A=RAD(A1):DRAW 725+200*SIN(A),600+100*COS(A)
580NEXT A1
585DRAW 250,475
600ENDPROC
    
```



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## Off at a tangent

**Mark Cornall** explains how trig functions work on the Commodore 64

**T**hese programs should help explain how microprocessors calculate values of sine, cosine and tangent, but first you need a little background information.

Before calculators came along, trigonometrical values were found by looking in books of mathematical tables. Nowadays, the easiest thing to do would be to place these same tables in the machine, but this would use far too much memory. Instead, they are worked out using Maclaurin's Theorem.

Maclaurin's Theorem is a complex power

series; in fact you might have guessed its complexity from the time it takes a calculator to work out a simple trig function. For anyone that understands power series, the numbers in the brackets in lines (program 1) 720 and 730 (2, 6, 24, 120....) are factorials of the powers in the same set of brackets.

The theorem only works if the angle is expressed in radians, so lines 700-710 convert the input values. If you prefer working in radians, simply change line 700 to:

700 Input (CLR) Enter Angle In Radians; X and omit line 710.

Now, on a different tack, we all know that  $\tan$  equals  $\sin$  divided by the  $\cos$ . Therefore, to calculate the  $\tan$ , the computer calculates first the  $\sin$ , then the  $\cos$ , and finally combines the two (lines 510-520, program 1). You can see that it should take longer to work out  $\tan$ , because the computer must do two complicated calculations instead of one.

To prove this to yourself, type in program 2, run it, and note down the time shown by the internal clock. Then change line 40 to:

40 Print Tan (0)  
Run the program again and check the time. Think about the results and compare them to what I've been saying.

Hopefully you should now understand a little more about how trig functions work on your Commodore 64.

### Program 1

```
0 REM *** MACLAURIN'S THEOREM - MARK 6,
1984 ***
1 POKE53280,11:POKE53281,11:POKE646,0:REM
*** SET SCREEN ***
200 INPUT"CLRJ$SIN,COS,TAN (S,C,T)";A$:REM
*** GET FUNCTION ***
210 IFA$="S"THEN300
220 IFA$="C"THEN400
230 IFA$="T"THEN500
240 GOTO200
297 :
298 :
299 REM *** SIN ***
300 GOSUB 700
310 SI=X-C+E-G+I:REM *** CALCULATE SIN ***
320 PRINT"CLRJ$MACLAURIN'S THEOREM SAYS:"
330 PRINT SI
340 PRINT"CU$THE COMPUTER SAYS:"
350 PRINT SIN(X)
360 GETA$:IFA$=""THEN360
370 GOTO200
397 :
398 :
399 REM *** COS ***
400 GOSUB 700
410 CO=1-B+D-F+H-J:REM *** CALCULATE COS ***
420 PRINT"CLRJ$MACLAURIN'S THEOREM SAYS:"
430 PRINT CO
440 PRINT"CU$THE COMPUTER SAYS:"
450 PRINT COS(X)
460 GETA$:IFA$=""THEN460
470 GOTO200
497 :
498 :
499 REM *** TAN ***
500 GOSUB700
510 SI=X-C+E-G+I:CO=1-B+D-F+H-J:REM ***
CALCULATE SIN AND COS ***
```

```
520 TA=SI/CO:REM *** CALCULATE TAN ***
530 PRINT"CLRJ$MACLAURIN'S THEOREM SAYS:"
540 PRINT TA
550 PRINT"CU$THE COMPUTER SAYS:"
560 PRINT TAN(X)
570 GETA$:IFA$=""THEN570
580 GOTO200
697 :
698 :
699 REM *** GET ANGLE ***
700 INPUT"CLRJ$ENTER ANGLE IN DEGREE'S";A
710 X=(A*3.14159265)/180:REM *** CHANGE TO
RADIAN ***
717 :
718 :
719 REM *** DEFINE TERMS OF POWER
SERIES ***
720 B=((X^2)/2):C=((X^4)/24):D=((X^6)/720):
E=((X^8)/40320):F=((X^10)/362880):
730 G=((X^12)/4790016):H=((X^14)/84685440):I=
((X^16)/1709017600):J=((X^18)/37158912000)
740 RETURN
```

### Program 2

```
10 REM *** FUNCTION TEST ***
20 TI$="000000":PRINT"CLRJ$"
30 FORI=1TO500
40 PRINTSIN(I)
50 NEXTI
60 PRINT"TIME=";TI$
```



Thousands of Micro owners have yet to discover that their computer can help with many of the problems and decisions that come up every day in the home or office.

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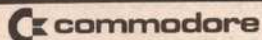
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# Open Forum

**Open Forum** is for you to publish your programs and ideas. Take care that the listings you send in are all bug-free. Your documentation should start with a general description of the program and what it does and then give some detail of how the program is constructed.

## Stitcher

on Dragon

This program consists of the computer drawing dots around the perimeter of an imaginary rectangle, and then drawing lines from the four corners of the screen to

the dots. An interesting 'stitched' pattern is built up as the dots are drawn. The computer does this seven times, increasing the distance between the dots by 2 pixels each time.

### Program notes

30 Sets inverse high resolution.

60 Increases the gap between the dots by 2 (2 pixels). If

the gap is 20 then the program starts again.

90-140 Draws lines from the 4 screen corners to the top side of the rectangle.

150-210 Draws lines from 4 screen corners to the left side of the rectangle.

220-280 Draws lines from the 4 screen corners to the bottom side of the rectangle.

290-360 Draws lines from the 4 screen corners to the right side of the rectangle.

The program can be altered by returning the screen to normal high resolution in line 30 and by changing the distance between the dots by adding a greater value to S in line 60.

```
10 REM *****STITCHER*****
20 REM **MICHAEL LAWTON**
30 PMODE 4,1:COLOR 0,5:PCLS:SCREEN 1,1
40 S=4
50 PCLS
60 S=S+2:IF S>20 THEN GOTO 370
70 A=64:B=192:C=48:D=144
80 PSET(B,A)
90 LINE(0,0)-(B,A),PSET
100 LINE(256,0)-(B,A),PSET
110 LINE(0,192)-(B,A),PSET
120 LINE(256,192)-(B,A),PSET
130 IF B<64 THEN GOTO 150
140 B=B-S:GOTO 80
150 PSET(B,A)
160 LINE(0,0)-(B,A),PSET
170 LINE(256,0)-(B,A),PSET
180 LINE(0,192)-(B,A),PSET
190 LINE(256,192)-(B,A),PSET
200 A=A+S:IF A>144 THEN GOTO 220
```

```
210 GOTO 150
220 PSET(B,A)
230 LINE(0,0)-(B,A),PSET
240 LINE(256,0)-(B,A),PSET
250 LINE(0,192)-(B,A),PSET
260 LINE(256,192)-(B,A),PSET
270 B=B+S:IF B>192 THEN GOTO 290
280 GOTO 220
290 PSET(B,A)
300 LINE(0,0)-(B,A),PSET
310 LINE(256,0)-(B,A),PSET
320 LINE(0,192)-(B,A),PSET
330 LINE(256,192)-(B,A),PSET
340 A=A-S:IF A<64 THEN GOTO 360
350 GOTO 290
360 FQR1=1 TO 1000:NEXT 1:GOTO 50
370 FOR I=1 TO 1000:NEXT I:GOTO 30
```

Stitcher

by Michael Lawton

## Microradio

GW6JJN



### Animated

An attempt now to catch up with some of the new software in the radio computing field. A letter received from Pinehurst Data announces a Spectrum version of the Morse Code reading program for the ZX81, that was reviewed a few weeks ago in Microradio.

Also from Pinehurst Data comes a Macro Construction and Animation program for the Spectrum. This will enable the

user to create animated scenes or cartoons of up to 15 minutes duration which will certainly appeal to the amateur television enthusiasts. Contact Pinehurst Data at 69 Pinehurst Park, West Moors, Wimbourne, Dorset, for more information. I hope to review these two programs soon in Microradio.

Once again, Grosvenor Software has been extremely busy with the release of three new Radio Teletype (RTTY) receive and transmit programs for the Vic20, Commodore 64 and Acorn Atom. Following on from the incredible RTTY programme for the Dragon reviewed in Microradio some months ago, Michael Kerry G4BMK, in the shape of Grosvenor Software, has probably done more than anyone else in making this fascinating mode of communication possible.

Combined with Roger Barker of G4IDE Microsystems, who has done the same for the Spectrum, Radio Teletype is now available cheaply for the most popular machines on the market. The new Grosvenor programs will be reviewed in a future Microradio, but further information can be obtained from Grosvenor Software, 22 Grosvenor Road, Seaford, East Sussex BN25 2BS.

Ken Dutton of Dingwall, Ross-shire, writes asking how to get into radio computing, pointing out that he has a BBC. The best advice I can offer, Ken, is to point you in the direction of RAMTOP, the radio-computing users group who deal with several micros, but especially the BBC. RAMTOP can be contacted at Great Billing Rectory, Great Billing, Northampton.

For those people with Sinclair micros interested in radio computing, the user group is SARUG, 3 Red House Lane, Leiston, Suffolk. I must ask anyone contacting user groups to include a stamped addressed envelope to be sure of a reply. The same goes for letters to Microradio, of course.

Memotech users interested in radio-computing will find a sympathetic ear in the shape of Dave West, 129 Old Stoke Road, Aylesbury, Bucks, who wants to contact like-minded Memotechs.

Ray Berry GW6JJN

This series of articles is designed for radio and microcomputer enthusiasts alike. If you have any queries that you want answered, hints and tips to share, or topics that you would like to see covered, write to: Ray Berry, Microradio, Popular Computing Weekly, 12-13 Little Newport Street, London WC2R 3LD.



## Function Keys

on Commodore 64

Page 16 of the *Commodore 64 User Manual* states: "The four function keys on the right hand side of the keyboard can be 'programmed' to handle a variety of functions. They can be defined in many ways to handle repetitive tasks." Further scrutiny of the user manual and also the *Programmer's reference guide* show that this is untrue much to my and many other programmers dismay.

But with this utility all those promises come true! A total of 12 function keys may be defined. The first four are the function keys on their own, the second four are with the shift key depressed and the last four are with the commodore key depressed. A maximum of 15 characters may be assigned to each key.

If the assigned function is a direct command then it will need a carriage return following it. To add one, press the f1 key after the command in quotation marks. If the command contains quotation marks these may not be typed in directly, but

must be replaced by the f3 function key control character.

Data for the defined functions (sample) are in lines 220-240. The first data string is for f1, the second f3, the third f5 and the fourth f7, next the shifted function keys, and finally the function keys with the Commodore button depressed.

### Program notes

- 130-145 M/c data.
- 150-165 Loads m/c into memory.
- 170-180 Activates interrupt.
- 185-195 Clear memory for functions.
- 220-240 Data for functions.
- 250 Reads functions into memory.

```
100 REM *****
105 REM ***** FUNCTION KEYS *****
110 REM *****
115 REM * BY GIDEON SUMMERFIELD *
120 REM *****
125 :
130 DATA 165,197,197,251,240,12,133,
    251,162,4,221,59,196,240,6,202,208
135 DATA 248,76,57,196,173,141,2,41,3,10,
    10,133,252,202,138,24,101,252
140 DATA 10,10,10,10,170,160,0,189,75,196,
    153,119,2,232,200,192,15,208
145 DATA 244,152,133,198,76,0,0,4,5,6,3,
    169,196,141,21,3,169,0,141,20,3,96
150 A=50176:D=A+74
155 FORB=ATOD
160 READC:POKEB,C
165 NEXTB
170 POKEA+58,PEEK(788)
175 POKEA+59,PEEK(789)
180 SYS(D-10)
185 FORI=1TO192
190 POKEB+I,0
195 NEXTI
```

```
200 :
205 REM 'F1' (' ') = 'RETURN'
210 REM 'F3' (' ') = 'QUOTATION MARK'
215 :
220 DATA"LOAD",1,1,"LIST"
225 DATA"RUN",,"LOAD",8,"
230 DATA"LIST-250",,"FRE(0)"
235 DATA",,,,,,"
240 DATA"PEEK(", "PRINT#", "MID$(", "THEN"
245 :
250 FORK=0TO11
255 READA$
260 FOKE=1TO15
265 S=MID$(A$,E,1)
270 IFS$="" THEN S=0:GOTO280
275 S=ASC(S$)
280 IFS=133 THEN S=13
285 IFS=134 THEN S=34
290 POKE50250+E*K*16,S
295 NEXTK
300 NEXTK
```

Function Keys  
by G Summerfield

## Arcade Avenue



### It's official

The whole question of arcade copies on home micros is vexed. Many large companies have made their vital initial funding and reputation from rehased *Pac-man* clones, yet the criticism is often heard these days that such unoriginal releases alienate the consumer and hurt the industry. Personally I doubt this (despite the plethora of average *Pengo* games on sale) because I appreciate the chance to sit and play a good implementation of my favourite

games at home.

American software companies have usually concentrated on releasing 'official' versions of arcade games which are licenced, and sometimes programmed by, the company that produced the original. The ones that have appeared over here have had two things in common — they were very high quality and very expensive, so much so that Atari or Commodore owners would think twice before buying. However, recently there have been a few important developments in this area.

The recent action by Activision against Microdeal for copying their *Pitfall* game must have caused a flutter of worry amongst British software writers. If, for example, Williams wanted to press their rights to the *Defender* game they could

make a case against Romik, Crystal, Softek and Acorn soft.

Until now these companies have been safe, and have even provided a service of sorts, because the people with the licence have not been interested in the UK software market. But now we have Atarisoft with their good conversions for, amongst others, the BBC and the Spectrum, which come in at almost three times the usual price for games in this country. In addition Parker Brothers will soon be releasing ROM cartridge 'official' arcade games for the Spectrum. Again they will be extremely good, but will cost around £20.00.

Whilst on the subject, copying from the arcades is not the only current sensitive area. I know that Software Projects have been bemused, to say the least, by the proliferation of

*Manic Miner* clones. There is no doubt that early offerings like *Blogger* from Alligata or *China Miner* from Interceptor owed most of their game concept to Matthew Smith, but how can you decide when an idea changes sufficiently to become original?

There is no doubt that *Son of Blogger* with its multi-screen levels, and the superbly colourful and musical *Arabian Nights* from Interceptor, are very worthwhile games in their own right.

Tony Kendle

The Arcade Corner is a new section for anyone who enjoys playing arcade games. If you have any comments, from playing tips on difficult games or programs you'd particularly like to praise (or blame!) then write to: Tony Kendle, Arcade Avenue, Popular Computing Weekly, 12-13 Little Newport Street, London WC2R 3LD.



## Converter

on BBC

This is a program which will convert Decimal, Hexadecimal and Binary numbers

from one base to another, and would be very useful for people studying 'O' level mathematics or computer studies.

When the menu has been displayed you simply enter the number of the conversion routine required (1-6) and then the actual number (in whichever base you are starting

from.) All the hexadecimal number should be entered as 4 digits — including leading zeroes, but the 16bit binary numbers will be filled with leading zeroes automatically.

The largest number the program can currently handle is 65535 but this could be altered with a bit of care.

```

5 REM "CONVERTER" written by A.FENNELL
10 CLS:MODE 7:B$="ABCDEF":DIM A(4)
20 PRINT:PRINT:PRINT:PRINT CHR$(141);"
  CONVERTER"
30 PRINT CHR$(141);"          CONVERTER"
35 R$=INKEY$(300):MODE 1:COLOUR 2
36 VDU 23,240,0,28,6,126,126,6,28,0
40 CLS:P$="":C$=""
50 PRINT:PRINT "1...DEC";CHR$(240);"HEX":
  C$=C$+"DH"
60 PRINT:PRINT "2...HEX";CHR$(240);"DEC":
  C$=C$+"H"
70 PRINT:PRINT "3...DEC";CHR$(240);"BIN":
  C$=C$+"DB"
80 PRINT:PRINT "4...BIN";CHR$(240);"DEC":
  C$=C$+"BD"
90 PRINT:PRINT "5...HEX";CHR$(240);"BIN":
  C$=C$+"HB"
100 PRINT:PRINT "6...BIN";CHR$(240);"HEX":
  C$=C$+"BH"
110 PRINT:INPUT Q
120 IF INT(Q)<1 OR INT(Q)>6 THEN GOTO 40
130 PRINT:PRINT "INPUT THE NUMBER":INPUT Q$
140 CLS:GOSUB (500+(Q-1)*500)
150 IF P$="" THEN R$=INKEY$(300):GOTO 40
160 GOSUB 4000
170 GOTO 40
500 IF VAL(Q$)>65535 THEN PRINT:PRINT
  "NUMBER TOO LARGE":RETURN
510 A=VAL(Q$)
520 A(1)=INT(A/4096)
530 A(2)=INT((A-A(1)*4096)/256)
540 A(3)=INT((A-A(1)*4096-A(2)*256)/16)
550 A(4)=INT(A-A(1)*4096-A(2)*256-A(3)*16)
560 P$=""
570 FOR I=1 TO 4
580 IF A(I)>9 THEN A(I)=A(I)-9:A$=MID$(
  B$,A(I),1):GOTO 600
590 A$=STR$(A(I))
600 P$=P$+A$
610 NEXT I
620 RETURN
1000 IF LEN(Q$)>4 THEN PRINT:PRINT "TOO LONG
  ":Q$=RETURN
1010 IF LEN(Q$)<4 THEN PRINT:PRINT "TOO SHORT
  ":Q$=RETURN
1020 FOR I=1 TO 4
1030 S$=MID$(Q$,I,1)
1040 IF ASC(S$)<48 OR ASC(S$)>70
  THEN PRINT:PRINT "INVALID CHARACTER
  ":Q$=RETURN
1050 IF ASC(S$)>57 AND ASC(S$)<65 THEN PRINT:
  PRINT "INVALID CHARACTER ":Q$=RETURN
1060 IF ASC(S$)>64 THEN A(I)=9+(ASC(S$)-64):
  GOTO 1080
1070 A(I)=VAL(S$)
1080 NEXT I
1085 J=1:A1=0
1090 FOR I=4 TO 1 STEP -1
1100 A=A(I)*(16^(J-1))
1110 A1=A1+A
1115 J=J+1
1120 NEXT I
1125 P$=STR$(A1)
1130 RETURN
1500 IF VAL(Q$)>65535 THEN PRINT:PRINT
  "NUMBER TOO LARGE ":Q$=RETURN
1505 A=VAL(Q$)
1510 DATA 32768,16384,8192,4096,2048,1024,
  512,256,128,64,32,16,8,4,2,1
1520 A$=""
1525 RESTORE 1510
1530 FOR I=15 TO 0 STEP -1
1540 READ B:A1=INT(A/B)
1550 IF A1=0 THEN A$=A$+"0":GOTO 1570
1560 A$=A$+"1":A=INT(A-(A1*B))
1570 NEXT I
1580 P$=LEFT$(A$,B)+" "+RIGHT$(A$,B)
1590 RETURN
2000 IF LEN(Q$)>16 THEN PRINT:PRINT "WRONG
  LENGTH ":Q$=RETURN
2010 DATA 32768,16384,8192,4096,2048,1024,
  512,256
2015 DATA 128,64,32,16,8,4,2,1
2016 RESTORE 10
2020 A=0:L=LEN(Q$):IF L<16 THEN L=16-L:
  FOR I=1 TO L:Q$="0"+Q$:NEXT I
2030 FOR I=1 TO 16
2040 READ B
2045 IF MID$(Q$,I,1)<>"0" AND MID$(Q$,I,1)
  <>"1" THEN PRINT:PRINT "INVALID
  CHARACTER ":Q$=RETURN
2050 IF MID$(Q$,I,1)="1" THEN A=A+B
2060 NEXT I
2070 P$=STR$(A)
2080 RETURN
2500 IF LEN(Q$)>4 THEN PRINT:PRINT "WRONG
  LENGTH ":Q$=RETURN
2510 GOSUB 1020
2520 IF P$="" THEN RETURN
2530 Q$=P$:P$=""
2540 IF VAL(Q$)>65535 THEN PRINT:PRINT
  "NUMBER TOO LARGE ":Q$=RETURN
2550 GOSUB 1500
2560 RETURN
3000 IF LEN(Q$)>16 OR LEN(Q$)<1 THEN PRINT:
  PRINT "WRONG LENGTH ":Q$=RETURN
3010 GOSUB 2010
3015 IF P$="" THEN RETURN
3020 Q$=P$:P$=""
3030 GOSUB 510
3040 RETURN
4000 PRINT:PRINT
4010 PRINT:PRINT Q$:MID$(C$, (Q-1)*2,1);
  " EQUALS"
4015 PRINT:PRINT P$:MID$(C$,Q*2,1)
4020 PRINT:PRINT "PRESS ANY KEY TO CONTINUE"
4030 INPUT R$
4040 RETURN

```

Converter  
by A Fennell



# Tony Bridge's Adventure Corner



## A unique game

Nick Walkland, who I mentioned in last week's Corner, wrote to me to say that he had won a Commodore 64 in Yorkshire TV's *The Game* — congratulations, Nick, it just shows what reading the corner can do for you.

Unfortunately, he's not too impressed with the adventures he's loaded into it, finding *Heroes of Khan* and *Rings of Power* both dull and slow. "Can anybody recommend a decent C64 adventure?" he asks. Nick, there are many American programs available, most of which are of a high standard. One problem, however, is that a disc drive is almost essential in order to enjoy them! If you can stretch your budget to this, you'll find no better place to start than the *Zork Trilogy*, from Infocom, which has just been released by Commodore at a very attractive low price (and, if you acquire a disc drive, buy, beg or borrow a copy of Microsoft's *Flight Simulator II*). It's a pity that you have completed so many home-grown adventures on the Spectrum, as many of the best ones, for instance, the Level 9s, are also available for the Commodore, and would be an automatic recommendation.

On to my main subject this week — "The Ice Crown has been destroyed. Victory to the Free!" or, alternatively, "Usharak has fallen! Victory to the Free!" If you're wondering what all this is about, then you are not of the fortunate band of *Lords of Midnight*. This is the adventure-strategy game from Beyond which is doing so well in the software charts.

The Grand Elf has had many letters about this wonderful game. Two came in the same post from the first people to let me know of their success in finishing *L of M* — the first was from Steve Baker of Leicestershire (postmarked 7:45pm, 9 July), and the second was from Dean Beale of Tamworth, who asked: "Am I the first?" Dean's letter was postmarked 9:10am, 9 July, so yes, Dean, you are the first to let The Grand Elf know. At about the same time came the news that four people had contacted Beyond — you'll remember that there is a unique competition open to *Midnight* players. At each step along the way to finishing the game, the present screen may be dumped to a printer, and the resulting pictorial record used in the first truly computer-generated "novel".

There are two ways of achieving success in *LOM* — by setting forth with your character Morkin in an adventure-quest to destroy the Ice Crown, which is resident in the Tower of Doom, and which is the source of Doomdark's power. Or the player can aim for a strategic victory, and seize the Citadel of Usharak, north of the Plains of Despair, from whence Doomdark controls his evil forces.

Dean doesn't reveal his method, but Steve took the citadel with his force of six thousand men — it took him 390 days of game time. There is an interesting division over which is the easier method. The majority of people seem to find the "adventure solution" easier, but there is a growing band who seem to revel in the more taxing "military" game. Actually, most players will probably find, like Richard Alexander of London SW20, that a combination of the two is the best approach — as the game progresses, one or other of the two prongs of attack will become stronger and dictate the course of events. The best strategy is, I believe, to send Morkin off on his quest, while keeping the Forces of Doomdark busy in other parts.

But let me hand you over to David Harrison of Burgess Hill in West Sussex:

"After 403 days, since the War of the Solstice began, the Lords of Xajorkith, Ithorn, Degrim, Whispers and Athoril, with the Utarg of Utarg and Thimurth the Fey, stormed the Citadel of Usharak, defeating

Doomdark's evil hordes.

"The Lord of Midnight is freed from the oppressive grip of the Dark Lord. However, Doomdark himself escaped on a steed, black as midnight, on Solstice-tide to Ice-mark, a land North-East of Midnight.

"All had seemed lost when Morkin, son of Luxor, and heir to the Land of Midnight, was slain in battle, while carrying the Ice Crown. Fawkrin the Skulkerin survived to journey south with the sad news to the Citadel of Xajorkith, under siege for many days. On hearing the fateful tidings, Luxor's wrath was released upon the foul hordes of the night. The Moonprince himself led a victorious assault on the armies surrounding the Citadel.

"Over the following 200 days, the Lord of Xajorkith, with an army of 2000 warriors and riders scoured the Land of Midnight, south of the Mountains of Ithril.

"Gradually, the Ice-fear weakened. Finally, Xajorkith took command of three of the largest armies of his Citadel and marched North-East, to recruit the Lords of Degrim, Whispers and Ithorn. Night and day, the armies of the Free marched Northwards, the Ice-fear growing as it bent its wrath upon them, until they reached the frozen wastes to the north of Midnight. Now they journeyed west to the Mountains of Death and sheltered in the Tower of Doom, from where, almost a year ago, Morkin had taken the Ice Crown.

"After resting, Xajorkith led the first assault on the Citadel of Usharak. However, the armies of Doomdark rallied to defend their Dark Lord.

"Finally, on the four hundredth day of the War of the Solstice, the Plains of Death and of Despair were cleared of the Evil foe, and the Lords of Midnight sheltered in the Keep of Despair while they were utterly invigorated. Four hundred and three days had passed since the War began, when Xajorkith led the final assault — the forces of Darkness were routed, and Victory went to the Free."

I hope David's experiences have whetted your appetite for this unique game. As Steve Baker said in his letter:

"This game is probably the best I have ever played on a computer: it contains all the elements of a world-beater."

Next week, I'll be giving you some hints 'n' tips on playing *Lords of Midnight*, but in the meantime, look at Phil McDonald's article in the August issue of *Micro Adventure* for more information.

## Adventure Helpline

Going bananas? If you are stuck in an Adventure with nowhere to turn do not despair — help is at hand.

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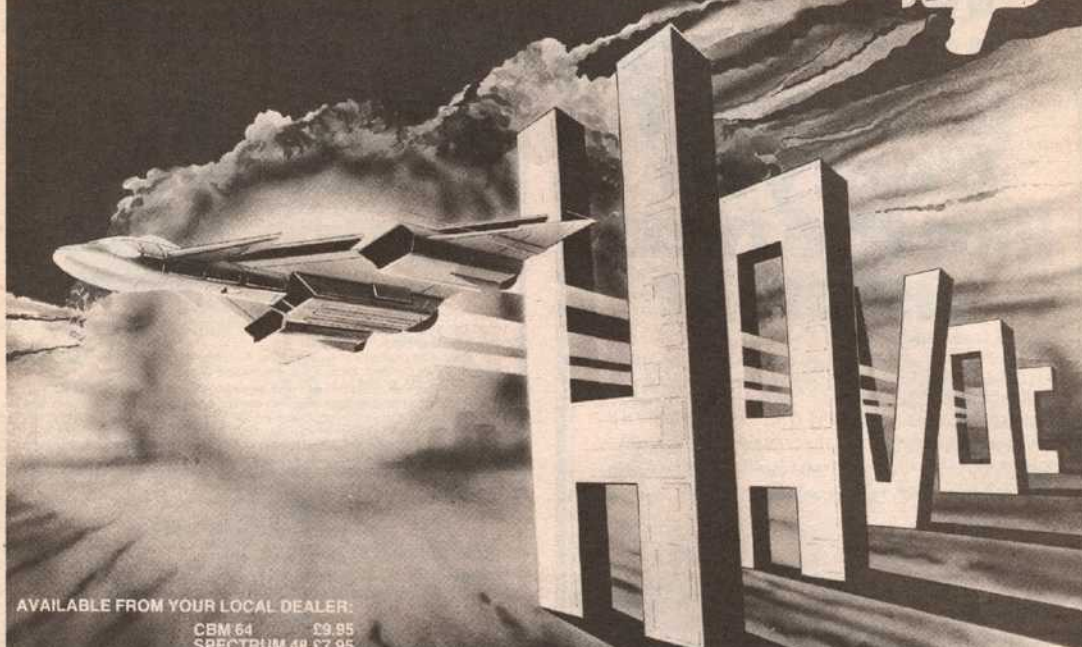
Remember — the system only works if those adventurers who have solved the puzzles get in touch. Every week is Save An Adventurer Today (SAAT) week!

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This series of articles is designed for novice and experienced Adventurers alike. Each week Tony Bridge will be looking at different Adventures and advising you on some of the problems and pitfalls you can expect to encounter. So, if you have an Adventure you want reviewed, or if you are stuck in an Adventure and cannot progress any further write to: Tony Bridge, Adventure Corner, Popular Computing Weekly, 12-13 Little Newport Street, London WC2R 3LD.



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## Over heated Spectrum

B Bennett of Burnley, Lancs, writes:

**Q** Could you please tell me the best way to prevent my Spectrum 48K from overheating. After about two hours use, the base of the computer gets really hot and I feel it could do some damage.

**A** The Spectrum is actually designed to get a 'hot bottom'. There is a flat metal plate (called a heat sink) inside the case which produces this effect. The amount of heat produced is not normally very high (you can't fry an egg on it), but is increased if you have your machine sitting on a carpet whilst it is operating.

Quite honestly, if your machine is working OK after two hours of use I would think that you have little to worry about.

## For the beginner

Christopher Thomas of Chester writes:

**Q** On some games for the Spectrum there are user definable keys. Could you tell me if it is possible to use a Kempston joystick with these and if so how? Also, which is the best book on machine code for the beginner?

**A** Unfortunately, there is no method that is easily explainable of converting games to utilise Kempston joysticks. Although many games are Kempston compatible, there are probably more that aren't. It would be nice if all software houses offered the same options as does Ultimate

(in *Atic Atac*) for example. Their software offers a choice of keyboard, or Kempston or Interface 1.

The answer to your second question may be familiar to regular readers; it is *Spectrum Machine Language for the Absolute Beginner*, published by Melbourne House.

## Zero line number

E Regan of Fleetwood, Lancs, writes:

**Q** I own a 48K Spectrum, and am writing a program involving a zero line number. I would like to know the *Poke* that produces this, and reverses this process.

**A** *Poke* (PEEK 23635 + 256 \* PEEK 23636) - 1,0. This rather complex statement will convert the line number of the first Basic statement in your program to 0.

By setting the second parameter of this *Poke* to 1, you will create an editabline 1 instead.

## Who sells it?

S Perkins of 33 Lister Street, Willenhall, West Midlands, writes:

**Q** Please could you tell me the address of anybody who sells the Spanish game *Escalador Loco*? I have been everywhere and can't find a shop that sells it.

**A** *Escalador Loco* is a Spanish game that is sold in this country under the name of *Jump for your life* by Unique. Their address is 16 Thorney Lane, South Iwer, Bucks. This game was reviewed in PCW, 13 September.

## Machine ability

Peter Hohnen of Humlebaek, Denmark writes:

**Q** I am thinking of buying a 32K Rampack for my 16K Spectrum. Could you please tell me of the pro's and con's compared to the factory upgrading? Will it reduce the machine's ability in any way?

**A** Personally, if I were you I would take the Ram-

pack option for one good reason. If you are an overseas mail order client, your contact with your supplier is likely to be even more fraught than usual. As long as you can buy your Rampack from your local dealer, then you should have no problems.

Using a Rampack will not in itself reduce the machine's capabilities in any way. You may have trouble in connecting other devices to your Rampack, but that is something else you can check if you 'see before you buy'.

## Graphic problems

F Holgate of Manchester writes:

**Q** Can you please help me before I throw my Vic20 out of the window? I have had my Vic three weeks now, and I cannot for the life of me discover how to produce the graphic characters I see in listings.

I cannot find reference to these in my books and as a beginner am getting frustrated to say the least. I do hope you can help me.

**A** If you press the shift key and a letter key at the same time a graphic symbol will appear on the screen. By making a note of which symbol appears for each shift/letter combination you should be able to overcome your difficulty.

## Confirmed Issue 3

Roberto Gorrara of London, writes:

**Q** I have been told that I have an issue 3 Spectrum. How can I confirm this? Also, will my machine work with a monitor?

**A** Print in 16602 will give the answer 191 if you have an issue 3 machine (it

gives the answer 255 for issues 1 and 2).

Your machine will work with a monitor, but only if the monitor has the correct interface.

## Amstrad support

D Scowrofe of Rossendale, Lancs writes:

**Q** I am considering buying an Amstrad CPC64 and would like to know more about its software support.

I would be grateful if you if you could tell me if any of the better software houses will be writing or converting software for this computer.

**A** Early indications are that a large number of programs currently available on the Spectrum will be appearing in Amstrad guises. Some Spectrum games have already appeared (*Codenamed Mat* for one) and Software Projects are known to be converting *Jet Set Willy*.

It is likely that the amount of software available for this machine will depend on how many are sold, and as the sales figures so far look encouraging, I guess that the current trickle of releases will turn into a flood.

## A long search

R C Jones of BFPO 25 writes:

**Q** I bought a Microprocessor MPF-II last year as I understood it would run AppleSoft programs. As I have been unable to find any software or literature for this type of computer, I wondered if you could assist me?

**A** My contacts in the publishing world have drawn a blank, I am afraid. It seems as though you may have a long and possibly fruitless search. (That is, of course, unless someone out there knows different?)

Is there anything about your computer you don't understand, and which everyone else seems to take for granted? Whatever your problem *Peek* it to Phil Rogers and every week he will *Poke* back as many answers as he can. The address is *Peek & Poke*, PCW, 12-13 Little Newport Street, London WC2R 3LD







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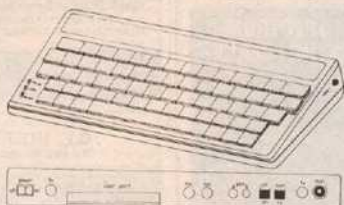
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Paddington Green  
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**VIC-20 + cassette unit + lots of s/w** original + mags excellent condition. Suit beginner. Can post. 01-892 6575.

**VIC-20 CARTRIDGE** £5.00 each. Ad-man — Speech Synthesiser. £30.00 Tel: 310-4031.

**VIC-20 + 16K Ram + C2N tape deck** £300 of original s/w, joystick + manuals Vic books. All boxed. £200. Tel: 061-231 4344 lan.

**CBM 64 + C2N** cassette, joystick + s/w + mags. Still boxed. £210.00 Tel: Andrew 01-592 7949.

**CBM SIMONS BASIC** £35 one. Tel: 0942 672058 after 5.30pm.

**C64 + C2N** games £195 one. Tel: 858 7572 after 6pm.

## Wanted

**WANTED.** Dragon joysticks. Will pay up to £10. Also wanted back copies "Dragon user". Up to Dec. '83. Tel: Fareham 235466 evenings only.

**WANTED.** Microprocessor MPF2 software, books. Also info on conversion to Apple programs. RC Jones, V.P.A.S.,

431 MU RAF Bruggen, BFPO 25.

**WANTED.** Baci issues of "Your Computer" and other magazines up to February 1984. Write stating price and issues available to: Charles Bajada, 36 Ursuline Sisters Street, G'Mangia, Malta.

**SWAP MY CBM 64** complete with 1541 disc drive and C2N cassette joystick. Lots of s/w books etc for a BBC model B computer. Tel: Bill on Bournemouth 424092.

**WANTED ADVENTURE** command module, for T199/4A: also extended Basic module. Tel: Uttoxeter (089-93) 2821 (eves).

**SWAP DIAMOND** mind for BBC phone Portsmouth 842785.

**SWAP A DRAGON 32** with s/w worth £150 and mags for Spectrum (no s/w needed) Phone Thanet 20544 ask for Anthony, or write to 3 High Street Margate Kent. CTG 1DL.

**SWAP MY FUJICA P2** Cine camera for any BBC peripherals or sell for £20 one. Phone 736 7714 ask for Satinder.

**SWAP MY 6 x 3** snooker table plus cues and pool balls for a modern for the Vic 20. Ring Paul on 0702 504552. Southend on Sea.

**WANTED: SPECTRUM** user with microdrive and/or Tandy CGP 115 printer to become pen friend and swap original software, tips, hints, etc. Please write Mr T D Parsons, 42 Park Leys, Harlington, Dunstable, Beds LU5 6LZ.

**WANTED RIVER RESCUE** cartridge box plus insip. Also need Hellgate, box and insip. And insips for Shadowfax, Space Storm. Will pay asking price. Tel: 0292 75493 ask for Derek.

**WANTED DRAGON** minus leads: will hire off you for up to 4 weeks or will buy. Tel: Fareham 235466 eves. Paul.

**SWAP DRAGON DOS** cartridge for Premier DOS cartridge or sell for £60 one. Phone Peter Antrim 65345 for details.

**SWAP MY 2 MONTH** old snooker table with all accessories 6' x 3'. For CBM 64 and C2N, s/w if possible. Will add cash for more s/w. Tel 061 831 7167 after 10.00 am ask for Rashid.

**WANTED MODEL** expansion interface. Wanted TRS 80 model s/w for sale TRS 80 s/w (all original). Write to J W Brooks, 39, Tetbury Drive, Warndon, Worcester WR4 9LG.

**SWAP COMMODORE 1520** printer plotter manual 3 rolls paper 11 mths guarantee and £30 for Seikosha GP100A printer or similar for Vic 20 or sell £85. 021 353 9473.

**AMSTRAD CPC 464** modulator power supply for sale or exchange for anything (within reason) for the Amstrad. Wanted software for the above machine. Tel: Ferndale 731424.

**WANTED.** Pacer 16K rampack or similar for Jupiter Ace. 32K also considered. Telephone 0704 28814 or write to 11 Merlewood Avenue, Southport, Merseyside PR9 7NS.

**CAN YOU HELP?** Copy of "Your Computer" February 1984 issue wanted. Phone 0743 860096 (Butler).

**TO SWAP** Sony Walkman £50, Teleplay TV game £20, Electron Mastermind £5 and £15 cash for just Vic 20 Nothing else. Ring Terry on 68548.

**WWWWILL SOMEBODY** phone me if they want to sell any of these: (Vic 20) Gorf, Superlander, Omega Race, Adogenic's Forth, Computer War or Atari's Defender. I need them NOW! 0558 822506.

**WANTED URGENTLY** for Dragon 32 G4BMK Morse or RTTY Transceiver. Cassette or cartridge. Twelve games given. Microdeal, Salamander etc. Write to: William, 58 Ballron Crescent, Earmock, Hamilton, Scotland.

**WANTED CBM 64** plus C2N plus s/w + books etc. To swap for Sharp MZ700 + data recorder + printer + s/w Also swap 8 inch Shugart disk drives for CBM disk. 01 6830963 evenings only Austen Redmond.

**SWAP STONECHIP** prog joystick interface and gravity joystick for Fuller Box Master unit or Currah Speech. Tel: 01 6484110 evenings.

**WANTED BBC** model B 1-2 o/s preferably with disc drive. Tel: Farnworth (0204) 76035.

**BBC (B) REQUIRED.** £200 cash paid. Phone (05827) 69152.

**EXTENDED BASIC** module for T1994A wanted. Must be good condition with manual. Tel Leeds (0532) 401634; or write, Sam, 43 Upland Grove, Leeds LS8 2SX, with asking price.

**WANTED BBC** cassette recorder. Also software for BBC "B" plus disk drive. Plummer 302 Langford Road, Netherfield, Milton Keynes, MK6 4HY.

**SWAP 48K SPECTRUM, ZX** printer, tape recorder plus £180 software (all originals). For full size printer for CBM 64 Mr C Hudson Crayke House Cottage Muston Fley North Yorkshire YO14 0EQ.

**WANTED COMMODORE 64**, must be in good condition. Tel: 0698 832907. Ask for Brian.

**SWAP CASIO FX201P** programmable calculator for Spectrum note games program's ie Omnicalc Tasword ZX Slowloader etc. Telephone 0642 814251.

**TO SWAP,** Yakzee + Morris meets the bikers + Pimanai + Winged Warriors + Knot in 3D for AGF programmable joystick interface. Tel: 594 2281.

**SWAP COMMODORE 64, C2N,** joysticks, 7 books and software including pole position etc, worth well over £500, for BBC B, 5 1/4" disc drive and software. Tel: 0790 53161 after 4pm.

**SWAP Vic 20 + 16K Ram** + software worth £70 + joystick + Vic Revealed book + magazines worth over £100 for CBM 64. Tel: 458 2518 (anytime).

**WANTED 16K RAMPACK** and P.S.U. for ZX81. Units in need of repair might suit. Tel: Belfast (0232) 672477.

**SWAP.** Commodore 64 & C2N cassette player joystick, £160 of s/w & Sony 8" monitor in exchange or part exchange for BBC/B. Ring Trowbridge (02214) 69912 ask for Philip.

**I WILL SWAP** my Emmy 16 cine canister (as new) for any computer. Phone (0506) 630975.

**SWAP.** Fuller box and demo tape for Currah micro speech and manual or sell for £20. Phone 051 924 6998 after 5pm.

**SWAP.** Vic20 starter pack with joystick, data cassette & two cartridges and introduction to Basic part 1 for 48K Spectrum. Must be good condition or will sell for £90. Phone 0407 4509.

## For sale

**T199/4A, 2** manuals, extended Basic, rom, level cassette leads, POM module S/W Le Adventure, parse, tomb Store City, Cassette S/W wargame adventurer. £15 one Tel (Southampton) 7675519.

**QR** Speech unit, booklet, demo tape, £22.00 o.n.o. storechip programmable joystick interface £16.00 o.n.o. both under guarantee Tel: 0649 - 60636 (Peter) INTELLIVISION game with space syntheses + 2 games new cassette swap for CBM 64 + cash adjustment Tel: 01 - 519 3874.

**NASCOM3 MICRO** computer 48K cost £549 sell for £250 o.n.o. or swap. Tel Leamington spa - (0926) 20649 after 5 pm.

**MCP40** Printer + paper + sets of spare pens. Interface cable. Sell £100 & P&P or swap for brother HR5 for any printer and £50 cash. Tel: 0263798851 (Norfolk) A. Scott.

**QL FOR SALE** - Best offer Jecines Tel (0904) 769184.

**Zaxxon** Cartridge for Cbs colection with + Epsom S/W for swap or sell. Tel: (0633) 893975.

**DISCOUNT** Software used tapes selling at unbelievable price all originals at least 50% of normal price send SAE for list to: Chris Hall, 51 Clevely Park, Belfast BT8 4NB Northern Ireland.

**SENSORY A** chess computer sell £165 open to offers. Tel: 0302 69475 or 030267428.

**ZX MICRODRIVE** For sale £40 perfect working order with 8 months Sinclair guarantee send cheque/ P.O. to Mr Derek Scott 26D Harden Place, Hawick, Roxburghshire Scotland TD9 7BY.

**FULLER BOX** £25 OCP Editor assemble £5.50 monitor £5.50 paintbox £5.50 send cheque / P.O. to Mr R.J. Ingram Irelands Goose Green Warrnam Horsham West Sussex RH12 3RS also 50 P&P please.

**FOR SALE** Fuller master unit for Spectrum as new £27 also 12 pieces of software £20 or £40 for both Tel: (077382) 3703.

**THREE TAPES INC:** Hells temple, Oric flight, Acheron race, for Oric I £15 Altogether 01 241-3193.

**96K Lynx**, parallel printer interface and tape recorder Lynx computing book lynx user (two issues) Excellent condition worth £380 bargain at only £260 phone 01-603-6873.

**TRS80 S/W** level I & II (all Originals) Tel 021 742 1446.

**GRANDSTAND** Astro wars, power adaptor and bleep tennis worth £55 unwanted gift so first offer over £27 or swap for (Spectrum currah speech) Tel Ray (0268), 781244.

**PASCAL 4T** With turtle graphics for ZX Spectrum used only twice £15 Telephone (0493) 720774 (Mornings)

**BROTHER DAISY** Wheel printer 2 ribbons, 4 Daisy wheels leads connecting 64. £500 all with dust cover. Tel: 659 2098.

**ONC 16K**, cassette recorder + B+W T.V. £60 of 300ks, £50 of original tapes worth over £300. Any offer over £100 considered Tel: 01 699 - 5353.

**ORIC 48K** £100 inc £80 of S/W Tel Houghton-le-spring 845951.

**DOWNSWAY JOYSTICK INTER-**FACE. Hardly used £15.00 Tel: Mr. I. Puxty. 805-2831

**SHARP MZ 700** fitted cassette + joystick + peeking + poking MZ700. Dust cover, games S/W £120. Tel: Uxbridge (0895) 59676.

**SCISYS** chess champion, Mark 6 and Mark Module £170 one Casio PB 700 Portable Computer 32K RAM 16K RAM £160 one Tel: 01-531-2892.

**LYNX 48K** + Tape recorder, Leads, Manual 300ks, + S/W £100. Tel: (0685) 877039 eves/weekends.

**VETRA JOYSTICK**, unwanted Gift. 2 fire buttons Grip style handle. Cost £11.95. Sell for £5.00. Tel: Milton Keynes 586-765.

**LYNX 96**. As new, 300ks, 20 cassettes all original, joystick + Interface, Cassette deck etc. £500. Sell for £300. Tel 01 204-1660. after 7pm.

**SENSORY 9** Chess Computer for sale Cost £165 open to offers Tel: 0302-494 75.

**CURRAH SPEECH.** Spectrum S/W latest releases, (Originals) for sale. Cheap prices. Tel (0705) 473968.

**ZX Interface 2, Microdrive** + 2 cartridges very good condition will sell for only £80 Tel: (0925) 51753.



## ADVENTURE HELPLINE

**Denis Through the Drinking Glass on Spectrum.** I cannot get the first drink and I cannot get out of Number 10. I Hamilton, 24 Byron Road, Sheffield S7.

**Hobbit on Commodore 64.** How do I get out of the goblin's dungeon? How do I open the magic door and the side door in the mountain? Philip Marsh, 27 Riverdale Road, Ferrylane, Stanley, Wakefield, W Yorks.

**Espionage Island on Spectrum.** I cannot get beyond killing the guard and going in the boat. what do I do next? Also, how do you operate the torch? Derek Taylor, 60 Allen Road, Rushden, Northants.

**Hobbit on Spectrum.** I am playing the adventure with 8-9 year olds. I have 'mastered' 10% only and they are losing interest. Can someone give me some clues? D A Kessell, 'Kessfield', Mabe, Penryn, Cornwall.

**Hobbit on Spectrum.** I need some help with the return journey. N R Williams, Hamar, Llanyby, Pwllheli, Gwynedd, N Wales.

**Inca Curse on ZX81.** What object(s) do I need to go down the porthole in the sand dungeon and to pass through the secret panel in the east wall of the panelled room? S Davis, 60 Millais Road, Leyton, London E11.

**Eric Bean & the Lost Gnomes on Spectrum.** I keep being stabbed to death by the goblin with the pikes-taff. The Good Fairy is not very obliging and only resurrects me once. Michael Francis, House 75, Castle Irwell, Cromwell Road, Sal-

ford M6, Lancs.

**Urban Upstart on Spectrum.** How do I get out of jail? If I eat cheese or drink lager I just return to the hospital. P Boyes, Lingmoor, Keighley Road, Cowling, Keighley, W Yorks.

**Heroes of Karn on Commodore 64.** How do I kill the pirate? Where is Anton's magic mirror? How do I get past the serpent? P E Arthur and J Arthur, 230 Baldwins Lane, Croxley Green, Rickmansworth, Herts.

## Diary

Event	Dates	Venue	Admission	Organisers
<b>Personal Computer World Show</b>	Sept 19-22 10.00am-7pm Sept 23 10.00am-9pm	Olympia 2, Hammer Smith Rd, London W6	£3.50	Montbuild Ltd 01-496 1951
<b>ZX Fair</b>	Oct 6 10.00am-8.00pm	Pudsey Civic Centre Pudsey W Yorks	75p adults 50p children	Northern Premier Exhibitions 0332 533554
<b>Livingston Computer Fair</b>	Oct 6-7 10.00am-5.00pm	Peel House Ladywell Livingston W Lothian	£1.00 adults 50p children	Itec/W Lothian Computer club 0896 39046
<b>Computer Graphics 84 (over 18s only)</b>	Oct 9-10 10.00am-6.00pm Oct 11 10.00am-4.00pm	Wembley Conference Centre	Free in advance £5.00 on door	Online Conferences 01-868 4488
<b>Apricot and Sirius Show North</b>	Oct 16-18 10.00am-6.00pm	New Century Hall New Century House Corporation Street Manchester	Free in advance from organisers	16 Bit Computing Magazine 01-241 2354
<b>Computer Games and Systems Retailer Show (trade only)</b>	Oct 17-18 9.00am-5.30pm	Novotel London W6	Free	Macro Exhibitions 0892 469556
<b>Home Computer Education and Games Fair</b>	Oct 20 12.00pm-8.00pm Oct 21 10.00am-6.00pm	Latton College of Higher Education	£1.50 adults £1.00 children	Shaw and Kilburn 0582 28811
<b>Electron and BBC Micro User Show</b>	Oct 25-27 10.00am-5.00pm Oct 28 10.00am-4.00pm	Alexandra Palace London N22	£3.00 adults £2.00 children	Database Publications 061-496 8383
<b>Home Tech 84</b>	Oct 26-29 10.00am-6.00pm	Bristol Exhibition Centre	£1.50 adults £1.00 children	Nationwide Exhibitions 0272 650465

## Special Tape Offer

Popular Computing Weekly exclusive  
DISCOUNT TAPE OFFER

## Nightmare Planet

for the Commodore 64

ONLY

£1.50

plus 25p post & packing

On a routine flight to Zen you are caught in a flash meteor storm and forced to make an emergency landing on *Nightmare Planet*.

You black-out during the crash and when you come round your valuable human cargo is missing...

*Nightmare Planet* is a text adventure for the Commodore 64 written for PCW by Mike Grace.\*

All you have to do to get your *Nightmare Planet* cassette is to collect the three special coupons in this and the next two issues of Popular Computing Weekly and send them, together with a cheque or postal order for £1.75 made payable to Sunshine Books, to 'Nightmare Planet Offer', Popular Computing Weekly, 12-13 Little Newport Street, London WC2R 3LD.

\**Nightmare Planet* was also published in the Sunshine Book *Commodore 64 Adventures* by Mike Grace





- Vic 20**
- (-) Psycho Shopper (Mastertronic)
  - (-) New York Blitz (Mastertronic)
  - (-) Chariot Race (Micro Artistic)
  - (-) Phantom Attack (Mastertronic)
  - (-) Snooker (Visions)
  - (-) Crazy Kong (Interceptor)
  - (-) Sub Hunt (Mastertronic)
  - (-) Undermine (Mastertronic)
  - (-) Bridge Man (Voyager)
  - (-) Mower Mania (Voyager)

(Figures compiled by Boots/Websters)

- Commodore 64**
- (-) Scramble (Leisure Genie)
  - (-) BMX Racers (Mastertronic)
  - (-) Caveman (Ocean)
  - (-) Decathlon (Activision)
  - (-) Hunchback (Ocean)
  - (-) Manic Miner (Software Projects)
  - (-) Space Walk (Mastertronic)
  - (-) Arabian Nights (Interceptor Micros)
  - (-) Hektik (Mastertronic)
  - (-) Encounter (Hi Tech)

(Figures compiled by Boots/Websters)

- Atari**
- (-) Bruce Lee (Datasoft)
  - (-) The Hulk (Adventure International)
  - (-) Encounter (Novus)
  - (-) Slinky (Cosmi)
  - (-) Sea Dragon (Adventure International)
  - (-) Caverns of Kalra (Cosmi)
  - (-) Air Strike 2 (English Software)
  - (-) O'Reilly Mine (Datasoft)
  - (-) Zaxxon (Datasoft)
  - (-) Rally Speedway (Adventure International)

(Figures compiled by Calico Computers, Birmingham 021-632 4498)

- Dragon 32**
- (-) Up Periscope (Beyond)
  - (-) Ring of Darkness (Wintersoft)
  - (-) Chuckie Egg (A&F)
  - (-) Pedro (Imagine)
  - (-) Hunchback (Ocean)
  - (-) Hungry Horace (Melbourne House)
  - (-) Chocolate Factory (Minis)
  - (-) Dragonfly 2 (Hewson)
  - (-) Space Shuttle Simulator (Microdeal)
  - (-) Cave Fighter (CAB)

(Figures compiled by Boots/Websters)

- Books**
- (1) Commodore Programmers Reference Guide (Pitman)
  - (2) Machine Code Sprites & Graphics (Sunshine)
  - (3) Inside your Spectrum (Sunshine)
  - (4) DIY Robotics & Sensors on the CBM 64 (Sunshine)
  - (5) Discover your Spectrum (Century)
  - (6) Introducing Commodore 64 Machine Code (Granada)
  - (7) Practical Spectrum Machine Code (Silva)
  - (8) 60 Programs for the Vic20 (Pan)
  - (9) 100 Programs for the BBC (Prentice Hall)
  - (10) Giant Book of Games for the Dragon (Fontana)

(Figures compiled by Boots/Websters)

## QL Value

Bernard Babani Books have produced one of the best books on the QL. The company specialises in small pocket books that retail for a mere £1.95. *An Introduction to Programming the Sinclair QL* is only 99 pages long, but contains more useful information than almost any of the other glossy books retailing for considerably more.

To be fair to the other books, they aim for an audience which is fresh to computers and consequently spend a lot of time on what lead goes where. But actual experience tends to suggest that the current crop of QL owners have had a computer before.

This books jumps straight in with variables and arrays; there are number of examples of their use — the section is not difficult but not an idiot guide either. Later sections cover using the Beep command, interfaces, turtle graphics, scrolls, pan and windows.

If you're one of those people who have had a previous computer, then you should have a little computer knowledge and could find this book very useful indeed.

**Book** *An Introduction to Programming the Sinclair QL*

**Price** £1.95  
**Micro** QL

**Supplier** Bernard Babani  
The Grampians  
Shepherds Bush Road  
London W6 1NF

## Catch 82

It's a banal comparison to equate the number of pages in a book with its worth, but when a computer book costs £5.95 (computer books being generally overpriced anyway) and has only 82 text pages, I feel it's worth noting.

What there is of *The Commodore 64 Disk Book* is interesting for disc owners. Sections include data storage of various kinds of file; relative, random access and sequential, using the Basic commands and changing the drive device number.

About a third of the book is taken up with appendices of disc commands, error messages and a few programs. As I say, what there is of the book is pretty good.

**Book** *The Commodore 64 Disk Book*  
**Price** £5.95  
**Micro** Commodore 64  
**Supplier** Century Communications  
Portland House  
12-13 Greek Street  
London W1V 5LE

# This Week

Program	Type	Micro	Price	Supplier
Jupiter Jumpman	Arc	Ace	£5.50	MegaTechnic
Paint N Run	Arc	Ace	£5.50	MegaTechnic
Ex Forth	Ut	Ace	£5.50	MegaTechnic
Adventure Quest	Ad	Amstrad	£9.95	Level 9
Clossal Adventure	Ad	Amstrad	£9.95	Level 9
Dungeon adventure	Ad	Amstrad	£9.95	Level 9
Snowball	Ad	Amstrad	£9.95	Level 9
Galaxia	Arc	Amstrad	£5.95	Kuma
Forecast	Ut	BBC	£15.00	Triptych
Buzz Off	Arc	Commodore 64	£5.95	Electric
Havez	Arc	Commodore 64	£9.95	Dynavision
High Noon	Arc	Commodore 64	£7.90	Ocean
Kokotoni Wilf	Arc	Commodore 64	£6.95	Elite
Minipedes	Arc	Commodore 64	£5.95	Anirog
Tom Thumb	Arc	Commodore 64	£5.95	Anirog
Death Valley	Arc	Dragon 32	£6.50	Micro Data
The Canal Game	Arc	Dragon 32	£5.99	Unique
Screen Copier	Ut	Dragon 32	£3.00	Unique
Bel Base	Ut	Electron	£16.00	Bel Tech
Mail Shot	Ut	Electron	£9.50	Bel Tech
Buzz Off	Arc	MSX	£8.95	Electric
The Final Mission	Ad	Spectrum	£5.50	Incentive

The Key to Time	Ad	Spectrum	£5.95	Lampsoft
The Legacy	Ad	Spectrum	£5.95	Tamsot
The Mask of Iden	Ad	Spectrum	£5.95	Artic
Kokotoni Wilf	Arc	Spectrum	£5.95	Elite
Prytrax	Arc	Spectrum	£7.95	The Edge
Numbers at Work	Ed	Spectrum	£18.00	Triptych
Hustler	S	Spectrum	£6.99	Bubble Bus
Decision Maker	Ut	Spectrum	£15.00	Triptych
Star Seeker	Ut	Spectrum	£15.00	Triptych
Tiny Code	Ut	Spectrum	£5.50	Amazing Games

Key: Ad — adventure/Arc — arcade/Ed — education/  
S — strategy-simulation/Ut — utility

This Week is a new section that covers all the new software coming on to the home micro market each week. All suppliers should send details of their new programs to: This Week, *Popular Computing Weekly*, 12-13 Little Newport Street, London WC2R 3LD.



## ARSONIST

*Piromania* is the latest of Automata's arcade games and it reveals the dark side to the Piman's nature — well a light side really since he keeps setting things aflame.

The Piman it would seem is an arsonist.



In the game you are the weary member of the fire brigade whose task it is to extinguish the fires the little pink devil has started on the various floors of Automata Towers. The main idea is to fill a bucket with water from a tap at the bottom of the screen and climb to the various levels where fires rage and put them out. You fight not only time but stray dynamite, blocked escape routes and sundry other obstacles.

The entire conflagration is topped off with a pink elephant dancing on the roof and dousing the flames with his trunk. Graphics are small but detailed — good fun.

**Program** *Piromania*  
**Price** £6  
**Micro** Spectrum  
**Supplier** Automata  
27 Highland Road  
Portsmouth  
Hants PO4 9DA

## PASSWORD

*System 15000* is an absolutely wonderful idea for a program that does not appear to have been considered before — artificial hacking!

Hacking has a wonderful appeal, beating the system and

all that, men against machine, but the real thing has several big problems associated with it. The first is the enormous telephone expense for all that time spent on the modem; the second, is the CIA and FBI who will almost certainly arrest you if you screw up.

*System 15000* closely mimics a vast number of different databases — and you have to hack your way around discovering passwords, etc. Your objective is to find and return \$1,500,000 to its rightful place.

Getting about in the artificial system is as difficult and rewarding as any adventure game and a lot of thought has gone into developing the game — the Commodore version even has authentic phone rings which change when you ring abroad. The Spectrum beeper does its best, too. Something different for adventure fans to try and a must for hackers everywhere. Versions also for Spectrum and BBC.

**Program** *System 15,000*  
**Price** £12.95  
**Micro** Commodore  
**Supplier** Craig Communications  
PO Box 46  
Basingstoke  
Hants RG21 1HA

## MORAL POINT

Who dares wins could easily be the motto for software houses this summer, but let us not forget it is also the proud battletory of none other than the SAS.

In *SAS Commander* from Comsoft you get to play a member of this elite corps that defends our liberty. The idea of the game is to clear the streets of terrorists without killing the hostages. Neat idea, huh!

There are three streets to clear, each containing 10 terrorists. Two of the terrorists are protected by the hostages. You have to wait awhile before offing them; wait, in fact, for the hostages to turn into terrorists. I think it's clear that Comsoft are making a deep moral point here — aren't we all terrorists in someone's eyes, human nature is capable of many different points of view — freedom fighter or terrorist — who can say?

The graphics are goodish, for a BBC, and the game is well programmed, but is it just me who finds it all a bit dubious?

**Program** *SAS Commander*  
**Price** £4.95  
**Micro** BBC  
**Supplier** Comsoft  
7 Roman Drive  
Leeds West  
Yorkshire LS8 2DR

## LOST PLANET

Praised be the Quill. An outpouring of well-constructed adventures from people who would otherwise not have the programming skills to write them. *Rogue Ship* is a Quilled adventure which will, apparently, form the first part of a trilogy called *Earthquest* about the search for the lost planet earth.

Pick of the week

## GHOSTLY SERVANT

only smooth scrolling sprites but 3D at that. The effect is

The attempt to combine adventuring with moving graphics in a totally satisfying way goes on with *Avalon* from Hewson Consultants — best known for their *Air Traffic Controller* program.

*Avalon* is a high resolution, 3D multi-screen game where all commands can be expressed by up, down, left, right. Despite this, Hewson claim that its complexity should attract adventurers as well as the fans of *Atic Atac*.

In fact, *Atic Atac* is the obvious comparison here, *Avalon* looks and plays rather like it but with a number of differences — advances maybe.

You control a Wizard as he moves through a number of different rooms, collecting spells and seeking the way down to the eighth level where the lord of Chaos lives. The spells are not merely a euphemism for thunderbolts or lasers; there are a number of different types which have different functions, some zap, but others may give you a ghostly servant to do your bidding or make you invisible.

The graphics are superb, not



pretty spectacular and is only partly spoiled by the Spectrum's dreadful attribute problems.

The plot, graphics and complexity should ensure that this one runs and runs — a must for Christmas.

**Program** *Avalon*  
**Price** £7.95  
**Micro** Spectrum  
**Supplier** Hewson Consultants  
7 Grahame Close  
Blewbury  
Oxon OX11 9QE



two complaints, firstly why spaceships, lasers, robots, etc, why not make the plot really original, too. Secondly, £7.95 is a bit steep.

**Program** *Rogue Ship*  
**Price** £7.95  
**Micro** Spectrum  
**Supplier** Alan Pywell  
3 Cleve Avenue  
Matlock  
Derbys DE4 3BD

## SILLY PLOT

I wonder how much extra the Spectrum would have cost for it to have enough hardware not to have colour attribute problems and decent sound — £20?

The point is those two facili-



ties are all that keeps some of the most recently released Spectrum games from being amazing. A case in point being *Pyjamarama* from Mikro-Gen.

Continuing in the Wally series, this is a multi-screen cartoon quality epic with big colourful sprites and a silly plot. If only things didn't just keep on changing colour as they pass each other. Anyway, back to the game.

The format is very *Jet Set Willy*(ish), you have to wander around your home and find a clock. The reason for this is that you are asleep and want to wake up. No ordinary house, you find it is chock full of bouncing, zapping and jumping things; there are things to collect, some of which are vital for the continuance of the game like keys to doors.

*Pyjamarama* is like *Jet Set Willy*, but it has bigger graphics, but lacks some of the fiendishness in the layout of the

obstacles. If the colours didn't clash you really could think you were watching a cartoon.

**Program** *Pyjamarama*  
**Price** £6.95  
**Micro** Spectrum  
**Supplier** Mikro-Gen  
44 The Broadway  
Bracknell  
Berks

## ZOMBIES

For a while Mastertronic have been threatening to release a game at £1.99 that would compete with and even surpass those at full price. With *Chiller* they have done it.

*Chiller* is a multi (five) screen game which has a plot loosely based on a well-known 15 minute video not beloved of Jehovah's Witnesses. The game structure is definitely in the *Manic Miner* school, on each screen you have to grab a number of crosses whilst dodging packs of roving zombies and other nasty things.

To get to the crosses you have to guide a little figure that looks suspiciously like a well known, soft spoken, pop personality. Using the common left right jump, he must be made to climb ropes, leap over things, swing from branch to branch in the trees and so on. The idea is to jump and leap your way through the screens to find your girlfriend (knuckles rapped, Mastertronic, what about women who want to play this game?) who is held captive in a mansion and rescue her.

Not only is it fast, furious and addictive, but the Commodore even manages some attempt at an impersonation of the appropriate music. We were certainly boogying away happily in the office I can tell you. *Chiller* is, in short, excellent value. At £1.99 it puts many games at £7.00 or £8.00 to shame. My only worry is what appears to be a vast number of copyright infringements that must surely have American lawyers hot-footing it to the courts. Better buy your copy quickly before the writs hit the fan.

**Program** *Chiller*  
**Price** £1.99  
**Micro** Commodore 64  
**Supplier** Mastertronic  
Park Lane  
111 Park Road  
London NW8 7JL

## WILD WEST



*High Noon* is a return to the simplest of all arcade concepts — kill things without being killed. Here, complete with a musical tribute to *High Noon*, is that theme in the original, the wild west.

There isn't really much to the game beyond shooting at baddies who shoot back. To be generous, though, there are a good number of extra touches — like the undertaker who wanders out and drags off the dead for measurement. Later screens have the baddies on horseback and lobbing dynamite around. Not earth shattering, but fun.

**Program** *High Noon*  
**Price** £7.90  
**Micro** Commodore 64  
**Supplier** Ocean  
6 Central Street  
Manchester M2 5NS

## ROAD SIGNS

There's no doubt about it, at the moment the Spectrum has by far the most interesting and widest ranging software. Not only is it first with the brave new concepts like *Deus Ex Machina*, but it knocks other machines for six with unusual but useful oddities like *The Highway Code*.

The idea of the program is to supplement the highway code book and provide tests and examples on all the road signs and traffic light sequences, etc.

The program is no Basic-written throwaway either,

there are machine code graphics routines to give the whole thing a very slick look.

**Program** *The Highway Code*  
**Price** £6.95  
**Micro** Spectrum  
**Supplier** Ditek Computing  
11 Warwick Court  
Princess Drive  
Harrow  
Middlesex  
HA1 4UB

## POT BLACK

There have been a number of pool/snooker programs for the Spectrum, but *Hustler* must be one of the best.

The cursor keys or a joystick can be used to position the cursor and a gauge at the bottom of the screen lets you choose the power of your shot. In the Spectrum version you can also control spin-top, bottom, left or right with a choice of two strengths.

Apart from that you can play



against the machine or another player and there are six different games all based around the general concept of pool. It plays well, and if you want, and haven't yet got, a pool program this is the one to buy.

**Program** *Hustler*  
**Price** £6.99  
**Micro** Spectrum  
**Supplier** Bubble Bus  
87 High Street,  
Tonbridge  
Kent TN9 1RX

Compiled by Graham Taylor

New Releases is designed to let people know what software is coming on the market. If you have a new game or utility which you are about to release send a copy and accompanying details to: New Releases, *Popular Computing Weekly*, 12-13 Little Newport Street, London WC2R 3LD.





## Smell, touch . . .

Contrary to popular belief there are more important uses for a micro than playing video games! More important than manipulation of data for uses such as small scale stock control and accounting.

The true value of a micro only becomes apparent when it is interfaced to the real world.

Imagine, if you will, your brain in a box separate from your body and being kept alive by sophisticated medical equipment. Your only connection with the world is by means of a clever device enabling you to read and write. What would life be like? Yes, you can think and, in a crude way, you can communicate but you can't smell, hear, speak, touch, taste or move.

As it would be for the human brain so it is for the humble microcomputer.

So what can be done to improve the lot of your poor micro?

Probably the simplest way of extending its influence is by means of digital to analogue (D/A) and analogue to digital (A/D) converters. These devices allow transference of data between the digital codes unique to computers and the analogue signals (voltage, length, pitch, speed etc) found in nature. A D/A converted linked to a micro via its parallel port gives a voltage output corresponding to a binary code fed into it. This voltage may then be changed, by appropriate electronics, into any analogue form required. The A/D performs the inverse operation, taking a

analogue signal by suitable electronics) and voltage (provided once again from any converting it into a binary code recognisable by the computer. These two devices allow control of the monitoring of anything from Scalextric to items around the home and garden.

Most of the above suggestions could probably be classified as 'movement' and 'touch'. What about the other microcomputer 'senses'? Many companies now offer plug-in boards enabling your micro to speak. These voice synthesis boards are usually self-contained, using none of the micro's memory and requiring the minimum of programming to run them. Although the cheaper one found on home micros still sound as if they have laryngitis, new devices now have produced have highly realistic voices—it is only a question of time before the prices come down. However the ability to speak English but not to understand it is like owning a Lamborghini and not being able to drive!

Unfortunately voice recognition units are not nearly as well developed as voice synthesis devices. Where they are available they are usually only for very expensive systems and even then are extremely limited in vocabulary and restricted to one user. Development, though, is progressing rapidly and prices for the best units are dropping fast. New work into increasing semiconductor density on VLSI (very large-scale integration) chips at the University of Oxford and others will bring these devices into the home computer price bracket within five years.

Finally, the most complex of all senses, sight. Devices can now be found (mostly in the States) allowing a video camera picture to be stored in a micro's memory and displayed on its screen. Unfortunately, this does not constitute sight. Sight is the interpretation and understanding of a picture which involves pattern recognition work at the forefront of computer technology. It is easily the most difficult problem yet tackled, but considering that 25 years ago voice synthesis and 15 years ago voice recognition, were viewed in the same light, the chances are that microcomputer sight will yet become a reality.

Glen Counsell

## Side-show

### Puzzle No 125

I was asked to devise a 'mathematical' side show at our carnival this summer.

Each player would have five ordinary dice which would be thrown on to the table. Then the product of the five numbers showing would be divided by the sum of those numbers. If the result was a whole number the player would win, if not, he would lose.



Thus if a 1,2,3,4 and 5 were thrown, the product (120) divided by the sum (15) would equal 8, so this would win.

However, in order to calculate the value of prizes for winning, it was necessary to calculate the odds involved. What are they?

### Solution to Puzzle No 120

As we are told that the first bill cost half of the money in the till plus half a pound, there must have been an odd number of pounds at the start so that the addition of the half a pound will result in a whole number of pounds.

The program tests successive odd numbers in turn, rejecting those that produce non integral results in the divisions, or those that result in a total that is not a multiple of 13.

```
10 POUNDS = 3.20 AMT = POUNDS * 100 FOR N = 2 TO 5
40 AMT = AMT - (AMT/N + 1/N) 50 AMT = VAL (STR
(AMT)) 60 IF AMT <> INT(AMT) THEN GOTO 120 70
NEXT N 80 AMT = AMT/13 90 IF AMT <> INT(AMT)
THEN GOTO 120 100 PRINT "ORIGINAL AMOUNT IN
TILL WAS", POUNDS, "POUNDS" 110 END 120 POUNDS
= POUNDS + 2 130 GOTO 20
```

This results in an initial sum of £719, from which bills of £360, £120, £60 and £36 were paid. This left a total of £143 which can be exactly divided by 13, the total cost of the mishaps being £876.

This is the lowest amount possible. Other solutions possible come out as £576 + £624\*N, where N is a positive integer. Gold star and bar for those that spotted this.

### Winner of Puzzle No 120

The winner is: D. Stanford, Sutherland Drive, Kewross, Tayside, who receives £10.

### Rules

The closing date for entries to Puzzle No 125 is October 5.

## The Hackers





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**DEUS EX MACHINA** is intended as a totally original audio-visual entertainment, in which the "player" actively takes part in a televised fantasy, fully synchronised to a stereo soundtrack. Enjoy it.

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**THE MACHINE**  
I am Machine  
Egg warm. Spinning  
Touch them with warmth  
This is our secret  
I am Machine  
Deus Ex Machina  
Stealing one egg  
No one may notice  
This is our secret  
Touch them and hold them  
Spinning.

Tuesday evening, after tea and compulsory prayers, the last mouse on Earth tried to hide from Mankind, inside the Machine. Just before it died, as the nerve-gas eased its sphincter, the last ever mouse dropping caused a slight accident. You may control the progress of this Accident, on my behalf, and with my permission, and lead it up the telepath.

**THE FERTILISER**  
(Wocha cock!)  
I'm a Fertilising Agent,  
My brothers are all wriggly.  
I'm a Fertilising Agent,  
My brothers are all wriggly.  
Touch us with a digit,  
Make us go all giggly.

Stir us up tavarich,  
Handy as a manual.  
Sinister and dexter,  
Handy as a manual  
Help us father woodlice,  
Tax collectors and a spaniel

**TEST TUBE BABIES**  
Cut the cord  
Let it fall  
Now I'm here  
I'm taking over.

What do we want? LOVE!  
When do we want it? NOW!  
What do we want? LIFE!  
When do we want it? NOW!

**THE DEFECT POLICE**  
Hello, hello, what have we here?  
A Defect, I'll be bound.  
A quantity of protein  
Crawling on the ground.  
It cannot be a Citizen,  
It don't not got a number  
Tattooed upon its baldy head.  
What is it then, I wonder?  
Let's scoop it up and take it  
For probing and dissection,  
And keep the Underlevels free  
From this sort of infection.  
Shove it in the mincer.  
Stretch it on the rack.  
I thought I heard an order  
To throw the Defect back. (Funny!)

I was conceived not in a test tube but in a pint mug.  
I never asked to be born,  
But since I'm here, I'm taking over.

Grimin  
EVANS

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